IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF OKLAHOMA

W. A. DREW EDMONDSON, in his capacity as ATTORNEY GENERAL OF THE STATE OF OKLAHOMA and OKLAHOMA SECRETARY OF THE ENVIRONMENT C. MILES TOLBERT, in his capacity as the TRUSTEE FOR NATURAL RESOURCES FOR THE STATE OF OKLAHOMA,	)
Plaintiff,	)
vs.	) No. 4:05-CV-00329-TCK-SAJ
TYSON FOODS, INC., et al,	)
Defendants.	)

- -

VOLUME I VIDEOTAPED DEPOSITION OF THOMAS C. GINN, produced as a witness on behalf of the State, in the above styled and numbered cause, taken on the 15th day of April 2009, in the City of Tulsa, County of Tulsa, State of Oklahoma, before me, Marlene Percefull, Certified Shorthand Reporter, duly certified under and by virtue of the laws of the State of Oklahoma.

Exhibit 1

A P P E A R A N C E S

FOR THE PLAINTIFF: Ms. Kelly Hunter Burch
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(via phone)

FOR GEORGE'S: Mr. James Graves
Attorney at Law
221 North College
Fayetteville, AR 72702
(via phone)

ALSO PRESENT: Opveon, Jason Weitholter

I N D E X

(Whereupon, the deposition began at 9:10 a.m.)

THE VIDEOGRAPHER: We are now on the record for the deposition of Dr. Tom Ginn. Today is April 15, 2009. The time is 9:10 a.m. Would counsel please identify themselves for the record? 9:10AM

MS. BURCH: Kelly Burch for the State of Oklahoma.

MS. COLLINS: Melissa Collins for the Cargill defendants. 9:10AM

MR. MIRKES: Craig Mirkes for Peterson Farms.

THE VIDEOGRAPHER: And on the phone?

MR. GRAVES: James Graves for George's and George's Farms.

MS. BRONSON: Vicki Bronson for Simmons. 9:10AM

THE VIDEOGRAPHER: Thank you. The witness may be sworn in.

THOMAS C. GINN,

having first been duly sworn to testify the truth, the whole truth and nothing but the truth, testified as follows: 9:10AM

MS. BURCH: Okay. I guess I'd like to make a record. Late yesterday evening before the deposition, what I understand a large amount of documents that were part of the considered material of Dr. Ginn were -- 9:10AM

counsel for the State was notified that it was going to be produced and it was actually produced about 7:30 this morning at the offices of Riggs Abney. I have not reviewed that material yet, but I understand that it is roughly 2,600 pages and -- and 1.8 gigabyte. I haven't seen it so I don't know that that's the case. I reserve the right to move to strike the report, depending on what the material is, or recall the witness for an additional deposition depending on what I find when I review the material. 9:11AM 9:11AM 9:11AM

MS. COLLINS: And the bulk of the material are actually articles and periodicals that were collected early on in the case, which might account for the seemingly large number of pages. But, in essence, there are two binders worth of e-mails and that is the core of the material. And based on the plaintiffs' history of producing documents and even to analysis long after their experts have been made available for deposition, it is Cargill's position that there has been no prejudice, but duly noted. 9:11AM 9:12AM

MS. BURCH: Okay.

DIRECT EXAMINATION

BY MS. BURCH:

Q Hi.

A Hello. 9:12AM

Q I'm Kelly Burch. I represent the State of Oklahoma in this case. Could you state your name for the record? 9:12AM

A Yes. My name is Thomas C. Ginn.

Q And where are you employed? 9:12AM

A I'm employed with Exponent and my office address is 1040 East Park Ridge Drive, Sedona, Arizona.

Q I'm going to hand you what I'm going to mark as Exhibit 1 to your deposition, which I'll represent is a copy of your expert report in this case. Do you recognize that as your expert report in this case? 9:12AM

A Yes, I do.

Q Would you turn to Page 9-1 of the report? Is that your resumT?

A Yes, it is. 9:13AM

Q And I hate to do this to you, but are additional qualifications listed in your report at Page 3-1?

A Yes, there are.

Q Okay. On Page 3-1, it indicates that you received a Ph.D. in biology with a specialty in estuarine ecology from New York University in 1977, is that correct? 9:14AM

A Yes, it does.

Q What is estuarian ecology?

A Estuarian ecology is the relationship of organisms 9:14AM

that live in a -- in a river near the transition of 9:14AM that river with the ocean, which is called an estuary, where we have a mixing of salt and fresh water. My specialty in estuarian ecology was actually in what at the time was a relatively new discipline called 9:15AM ecotoxicology. And so specifically what I was looking at was the effects of water quality variables and toxic substances on invertebrate and fish in the lower Hudson River.

Q In the lower Hudson River where it meets the ocean, is that accurate? 9:15AM

A Yes, although it covered a fairly -- my research covered a fairly broad range, at least probably 100 miles of the river ranging from purely fresh water but tidally influenced parts of the river down to areas 9:15AM where they were near New York harbor where there was salt water.

Q And what type of water quality impacts were you looking at?

A The primary impact I was looking at was the 9:15AM effects of nuclear power plant operations on -- on invertebrate organisms and specifically effects of chemical discharges from the nuclear power plants, thermal discharge from the nuclear power plants and changes in overall biological communities as a result 9:16AM

of the cooling water withdrawal from the Hudson River 9:16AM by those nuclear power plants.

Q Was that -- was that the source of any water quality impacts was the withdrawal of cooling water as opposed to the discharge pollutants or was it both? 9:16AM

A It's both.

Q Okay. What pollutants specifically were you looking at?

A Well, I was looking at -- as far as the discharge from the power plants, I was looking at the effects of 9:16AM temperature, heated water that was discharged by the power plants and the effects of chlorine and various chlorinated compounds that were discharged by -- during the normal chlorination procedures at the power plants.

Q And what types of water quality impacts were you looking at as a result of temperature? 9:17AM

A Two kinds. One was the short term effects of temperature on organisms that were withdrawn in cooling water into the plant and were subjected to temperature increases. And then secondly, the lower level 9:17AM temperature increases that occurred when organisms were mixed into the discharge plume from the power plant, organisms in the river that it would experience a temperature increase at that time.

Q What kind of temperatures are we talking about? 9:18AM

A Can you explain what you mean? 9:18AM

Q How hot?

A How hot?

Q Mm-hmm.

A Well, temperatures that could range, as I recall, 9:18AM on the order of ten to 15 degrees Fahrenheit increase over ambient temperatures.

Q Did you -- were you looking at just invertebrates or were you also looking at other parts of the aquatic community? 9:18AM

A My research involved other areas, including fish and fish larvae. However, my doctoral dissertation itself dealt entirely with various kinds of invertebrates.

Q Did you -- what types of impacts did you observe with regard to temperature on invertebrates? 9:19AM

A Well, as part of my research, I -- I evaluated temperature effects in several ways. One was doing laboratory experiments where I held organisms in the laboratory and subjected them to temperature increases 9:19AM and then declining temperatures to simulate the effects of short term exposures. And then I also exposed organisms in the field to the elevated temperatures around the power plant. And I also sampled the organisms that were entrained into the cooling water at 9:19AM

the power plant and evaluated their survival, both during that plant passage and subsequent survival. And I was looking at effects that were both lethal effects as far as whether or not the organisms survived, as well as their ability to grow and reproduce normally following those exposures. 9:20AM

Q In all -- in terms of both the lethal effects and the growth and reproductive effects, were you looking at both short and long term exposures?

A Yes, I was. 9:20AM

Q What types of impacts on invertebrates or fish did you observe as a result of short term exposure?

A I defined what the -- the thermal tolerance limits were for various species. I was working mainly with amphipods, mysids, M-Y-S-I-D-S, and some insect larvae. And I defined for exposures ranking from a few minutes, as I recall, up to maybe an hour what their upper tolerance limits would be. 9:21AM

Q When you say "upper tolerance limits," are you talking about the levels at which you would observe either lethal effects or impacts on growth and reproduction? 9:21AM

A That's correct. The levels of both which I would see adverse effects.

Q Did you observe any adverse effects? 9:22AM

A Oh, I certainly did. Above certain temperatures there was -- there were both lethal effects and sub -- both at the time of exposure and then subsequent adverse effects following exposure. 9:22AM

Q Did you do any type of similar analysis with regard to fish? 9:22AM

A I did. I did research on -- in dealing with both eggs and larvae of some of the local fish as well as juveniles. That was separate research which was not part of my dissertation, per se. 9:23AM

Q What types of fish species were you looking at in that research?

A Oh, that was the striped bass, white perch, tomcod, some work with blueback herring and alewives.

Q Can you spell that last one? 9:23AM

A A-L-E-W-I-V-E-S. Or actually alewife is the singular, A-L-E-W-I-F-E. I think that's about it.

Q And was that -- was that research done also in the Hudson River or was that done in a different location?

A Some of it was done in the Hudson River, some of it was done at a research facility in upstate New York where I worked part time. 9:24AM

Q Was that research facility identified on your resumT?

A I don't believe it is. 9:24AM

Q Okay. What's the name of the facility? 9:24AM

A Well, it was a -- it was a facility owned by what at the time was called and may still be, the New York State Energy Research Development Authority, I believe. New York State ERDA. And as part of my work at New York University Medical Center, I participated in the development of a -- what was referred to as a condenser tube simulator. And that particular piece of equipment required a large amount of electrical power and so we ended up locating it up at this facility, this New York State ERDA facility to have access to the power requirements for that unit as well as the space requirements. 9:24AM 9:25AM

Q Okay. So when did you work for NYU Medical Center? 9:25AM

A I was employed by NYU Medical Center for -- from 1971 to 1977.

Q And what was your job title or responsibilities?

A My job title was assistant research scientist and I -- as part of that, my responsibilities were to conduct research as I've described to you previously and to also supervise groups of individuals that were conducting sampling both in the Hudson River and sampling at the Indian Point Nuclear Power Plant. 9:25AM

Q When you said -- the research that you did there, is that the research that we discussed earlier regarding impacts of temperature on various fish species or am I oversimplifying it? 9:26AM

A Well, all of my work that I've described so far was all done as part of my employment by NYU Medical Center. 9:26AM

Q Part of it, I understood, was for your dissertation?

A It was.

Q Okay. You were able to do your dissertation on research you were also doing for NYU Medical Center? 9:27AM

A That is correct.

Q Okay. In terms of the research we were just discussing regarding temperature impacts to fish species, what type -- what temperature levels do you recall that you identified where you have either lethal effects or impacts to growth and reproduction with regard to striped bass? 9:27AM

A I just -- I would be purely guessing at this point to try to recall that. Any of the thermal tolerances that -- they're in my publications, but I don't have them all in mind as I sit here today. 9:28AM

Q Did -- so this research that you're discussing with me has been published?

A Yes, it has. Most of it has in one form or 9:28AM

another. 9:28AM
Q Is the research that we're discussing listed in your expert report somewhere?
A In my resumT, I believe most of the publications would be there, although I -- as part of my resume, I 9:28AM put all of the articles that I published in either books or reference journal articles or some other -- for example, some government reports but it -- but my resumT does not list all of the publications that might have been associated with presentations at scientific 9:29AM meetings, abstracts, or non-refereed types of reports or articles.
Q Speaking specifically about any published research on striped bass, is it published in the manner that you would have listed it in your resumT? We can take a 9:29AM look at it.
A It may be and I could look, but there were -- I was participating with several others on the -- the striped bass studies particularly. And as I said, that was not part of my doctoral dissertation, so I would 9:30AM have to -- I could look at the list and see if I can recognize one that might have had some of the striped bass data, if you wish.
Q I do, if you don't mind.
A Okay. The -- there are a couple of papers that I 9:30AM

had in mind that I believe had some of the striped bass 9:31AM information in them. They were actually reports and they were part of a symposia proceedings, but I do not see them on my resumT. They would have been back in the -- probably late '70s or very early '80s and I 9:32AM don't see those publications here. There may have been some striped bass information in the article at the bottom of Page 9-5 authored by Poje, P-O-J-E, Ginn and O'Conner, but that is the only one that I see that might have had some striped bass information in it. 9:32AM
Q Do you still have a copy of the symposium proceedings that you're referencing?
A I'm not sure. I may have a copy. I would have to check.
MS. BURCH: Can I request a copy if he has a 9:33AM copy?
MS. COLLINS: We will certainly find the answer to that.
Q Would the -- if we went through the same discussion with regard to the other fish that you 9:33AM identified, would the results for those fish also be in the symposium proceedings as opposed to a paper or --
A Yes, they would. I don't -- the only fish results in this compilation of papers that are there, I think would be in the -- in the one article that I mentioned 9:33AM

on the condenser tubes simulator. I don't see -- oh, 9:33AM there's -- well, there's another publication. This is also on Page 9-5, by Poje, Ginn -- Poje, O'Conner and Ginn in 1982 that was Physical Simulation of Power Plant Condenser Tube Passage. That may have also had 9:34AM some fish information, but the larger multi-authored articles that I mentioned in the symposium proceedings are not listed on my resumT.
MS. BURCH: So that same request with regard to the other species. Is that clear? 9:34AM
MS. COLLINS: Yes.
MS. BURCH: I would like to make the same request as the other -- that I made on other species.
Q Did that research relate to just temperature impacts or did it also relate to any potential 9:35AM pollutants in the water?
A When you say "that research," which research are you talking about?
Q The research we were just discussing with regard to temperature impacts on, for example, striped bass 9:35AM that you did while you were at NYU?
A Okay. That research involved the effects of temperature, the effects of physical stresses on the fish as they pass through a -- through the cooling water systems of either the power plant itself or the 9:36AM

simulator. It involved an assessment of the effects of 9:36AM changes in hydrostatic pressure that occur during passage through both the simulator and the power plant, as well as the effects of chlorine and -- and chlorinated products that occur in the system and in 9:36AM the discharge plume of the power plant.
Q How do changes in temperature affect fish?
A Well, from a broadest sense, temperature affects fishes' metabolism rate. They affect the growth rate of fish and the degree to which they burn energy, grow, 9:37AM and develop.
Q What are -- what does the term "optimal temperature" mean to you in this context?
A Optimal temperature is the temperature at which the various physiological processes, and, basically, 9:37AM that the fish would be growing and -- and their metabolism would be okay, as opposed to a suboptimal temperature that may be lower than they both would prefer to be in and that they would function well in or a supra optimal temperature which would be high enough 9:37AM to where there -- they would not be doing as well, they may not be growing as well, for example, as they would at an optimal temperature.
Q You said a super (sic) optimal temperature?
A Supra. 9:38AM

Q Supra? **9:38AM**
A Yeah, above the optimal temperature.
Q So could we talk about suboptimal temperatures and what that means?
A Yes. 9:38AM
Q Okay. So is optimal temperature typically a range?
A Yes, it typically is.
Q Does that range vary in -- depending on, um, the location of the aquatic resource in the country? For example, a striped bass optimal temperature range in the Hudson River, would that be the same as a striped bass optimal temperature in, say, Lake Texoma? 9:38AM
A I don't know if it would -- if it would vary or not. That's why a lot of temperature studies are run, 9:39AM to evaluate that, and determine if there would be any differences.
Q Are there differences in optimal temperature ranges for different -- I'm not sure I'm going to use the right term here, but different strains of a particular species? 9:39AM
A There could be. I can't -- as I sit here, I can't think of any good examples, but it's at least conceivable that there could be differences between -- between strains or subspecies. 9:40AM

Q Have you ever done any research on anything like that? **9:40AM**
A No, I haven't.
Q Do water quality managers attempt to manage water resources to maintain optimal temperatures in the water for fish? 9:41AM
A There's so many different water quality programs, managers, I don't know if I could speak for what the managers' objectives are. I know that -- that water quality managers will look at the optimal temperature 9:41AM range for a species of fish and evaluate whether or not ambient conditions may be outside of that range.
Q Why do they do that?
A I would think that they would use it as one piece of information to evaluate what may be limiting factors 9:41AM on fish populations in a particular area.
Q What do you mean by "limiting factors"?
A Well, a factor that could be -- that could be -- could be either limiting overall production or growth or abundance of that fish population. Managers would 9:42AM typically look at that information to -- to try to assess the -- the quality of habitat, let's say, for a particular species. Now, species have the ability to certainly survive and, in some cases, thrive beyond an optimal range but managers may look at the 9:43AM

relationships with an optimal range to evaluate as far 9:43AM as a multitude of factors, not just temperature, but how a particular environment may suit that particular species.
Q When you use the terms -- the term "fish populations," what do you mean by that? Do you mean numbers only or the quality of the population as well? The health of the population as well? 9:43AM
A Well, I'm using it as -- in a more classic sense as far as a -- a group of organisms that would exist in 9:43AM some defined area and being a group of organisms that interbreed together and form a reproductive unit. It's usually expressed as -- as the population size in numbers. It can also be expressed as the biomass, the amount of that fish or whatever it is, but it's usually 9:44AM expressed as numbers.
Q When you're evaluating the quality of a fishery, are there other factors that are important to the analysis beyond population size or biomass?
A Yes, there are. 9:44AM
Q What are those?
A One would be the indications of the health of that -- of those fishes, where -- factors such as the growth rate, whether they are growing as might be expected, whether the population appears balanced as 9:45AM

far as the various age or size classes. In other 9:45AM words, does it have the expected numbers of -- of young of the year and juveniles and adult fish? Another would be the -- an indication of the -- the relative weight of that fish versus what would normally be 9:45AM expected. In other words, are they plump but relatively fat or are they long and skinny and are suffering some -- some food limitation. Another might be the indications of health, such as the presence of any lesions or cellular abnormalities. That can be 9:46AM external or on internal organs.
Q Anything else?
A I think that's all I can think of right now.
Q And in talking about this, are you talking about how you would evaluate the health of a particular species in a water body or how you would evaluate the health of a fishery? **9:46AM**
A I was speaking more from a biological standpoint as far as looking at a population of a particular species and evaluating that population. 9:46AM
Q For clarity, when we're talking about the health of a population, what do you mean by the health of a population?
A Yeah, that is a somewhat nebulous term, but from a scientific standpoint, I mean the various factors that 9:47AM

I -- that I talked about. Are the fish in that population, are they abundant, are they growing well, are they reproducing, all of those factors. Sometimes that's referred to as the overall health of a population, but it's different than what we would term the health of an individual fish that might be more associated with the presence of disease or the presence of abnormalities. 9:47AM

Q Just for further clarification, if we were talking the health of a fishery, what would that mean? 9:47AM

A Yes. As far as the fishery, that's -- that would involve some of those other factors that I mentioned as far as the numbers and kinds of fish that are present, but also it would indicate the -- or information could be used such as -- such as catch rates or anguler preferences or the results of -- of fishing tournaments or general records on anguler success rates. Or in many cases, fishery management agencies use test fishing methods to evaluate the abundances of game fish size fishes for various species to be able to determine whether or not there are -- are sufficient numbers of fish for anglers to catch and whether any changes in regulations may be warranted or things of that sort. 9:48AM

Q Is that a fairly comprehensive list of factors that influence the health of a fisheries (sic) -- or of 9:49AM

a fishery or are there additional factors? 9:49AM

A Well, factors that could influence the so-called health of a fishery could be very far ranging, including habitat factors, including fishing pressure, fishing pressure itself, water quality factors, changes in hydrodynamics, either human induced or natural. 9:49AM

Q It was sort of a different question on my part, wasn't it? You don't have to answer that.

Going back to other indicators of the health of a fishery, would that be a fairly comprehensive list or are there additional indicators of the health of a fishery? 9:50AM

A Well, as I -- at least what I could recall when you asked the question, I think that's what came to mind. 9:50AM

Q Is diversity an important characteristic of a healthy fishery, species diversity?

A Well, it is a -- species diversity is a -- I think I mentioned the numbers and kinds of fish species and that's -- that is what diversity depends on, but various fisheries can have different diversities. I mean, it is important but it's -- but it depends on what that diversity means. If you mean diversity in the classical sense of a diversity index, then that has some relevance, but it's not one of the important 9:51AM

things. But diversity in a more general sense of what kinds of prey species are there, what kinds of predators may be competing, what -- it involves large issues associated with interspecific competition and prey availability. 9:51AM

Q Do you ever -- in evaluating the health of a fishery, do you ever look at shifts in populations with regard to particular water quality influences?

A I would -- I think that could be a factor that's evaluated, yes. 9:52AM

Q Have you ever evaluated that type of factor?

A Well, I'm thinking back at some work I did. I think there's at least a couple publications listed for evaluating the biological responses of new cooling lakes. In other words, cooling lakes that have power plants set up on them and -- that might be subject to warming trends. And I participated in a study a number of years ago concerning developing models to predict the response of not only fish communities but other communities in these lakes as the result of -- of power plants being put onto them. 9:53AM

Q So these are not newly constructed lakes, they're existing lakes that become cooling water lakes or --

A Yeah, as I recall -- well, I would have to go back and look at that, but it was -- I think even the title

talked about new -- new cooling impoundments, but I don't recall whether it was restricted to lakes that were constructed new for the purposes of a cooling water impoundment or whether it would also include applicability to existing lakes that had a power plant built on them. I just don't recall right now. 9:53AM 9:54AM

Q So I referred to shifts in population and asked you if that was important. Can you define what a shift in a population is?

A Well, a shift in a population could be a change in the abundance or the -- or the -- if you're talking about a population of a single species, a shift in either the abundance or the size or the age class, distribution of fish within that particular population. 9:54AM

Q Let's talk about it in terms of a fishery as a whole, shifts in populations of a fishery as a whole. 9:55AM

A Mm-hmm.

Q Can you define what that is?

A Could you restate that, please? I want to make sure I understand you. 9:55AM

Q Can -- does that make sense to you, the use of the term "shifts in populations" with regard to a fishery as a whole?

A Well, I guess -- I assume you're talking about the relationship between a shift in a population and what 9:55AM

that means in terms of a fishery or what it could mean in that -- and that would -- that would involve the interaction of looking at the change in the population of fish itself and then what that meant relative to -- to the fish available for anglers. In other words, are there fewer or more, are they bigger or smaller or whatever for the important fishery characteristics. 9:55AM 9:56AM

Q Okay. Does -- does water -- do changes in water quality in a lake, for example, ever result in an increase in a certain type of fish and a decrease in another type of fish? 9:56AM

MS. COLLINS: Object to form.

Q And I'm speaking in terms of population.

MS. COLLINS: Same objection.

A Well, I guess it's conceivable to me if the changes in water quality were significant enough, it's possible that that change could be advantageous to one species and disadvantageous to another, so that it's possible that a change in water quality could change the balances, so to speak, of those populations. 9:57AM 9:57AM

Q Can changes in temperature result in changes in balances of populations?

A If -- the answer would be yes if the changes in temperature were sufficient, of sufficient magnitude. It's conceivable to me that it could change the 9:58AM

balances of populations. 9:58AM

Q Have you ever observed any changes in the balances of populations as a result of changes in temperature?

A Oh, I'm casting back quite a ways here, but I -- as part of that work that I mentioned that was done in -- I believe it was done for EPRI, Electric Power Research Institute, where we were looking at cooling impoundments. One of the tasks, as I recall, was reviewing reports from -- I think most of the operating cooling impoundments, at least the ones in the U.S. where studies have been done. And there may have been studies that I reviewed at that time. I can't recall any specifically, but there may have been studies that showed those kinds of effects, either on a water body basis or on a more of a localized area of certain reservoirs. 9:58AM 9:58AM 9:59AM

Q Have you ever done any research yourself on that?

A No, I haven't.

Q Being changes in dissolved oxygen result in changes in the balance of -- balances of populations in a fishery? 9:59AM

A The answer is yes if those changes in dissolved oxygen were sufficient to, for example, cause stresses to or mortalities of a particular species. That could -- and/or fish have widely differing tolerances to reduced dissolved oxygen levels so that it is conceivable to me that if dissolved oxygens were sufficiently low that it could affect the so-called balance of those populations. 10:00AM 10:00AM

Q In the context of fishery management, why is -- do you think that maintaining a balance of -- balances in the populations of the various fish, do you think that's important? Do you want me to rephrase that? I'll be glad to. 10:00AM

A Please. 10:00AM

Q Okay. In terms of fishery management, do you think it's important to maintain balances of various populations in a fishery?

A That all depends on the -- on the goal of the fishery managers. In some situations, a particular water body may be managed for, let's say, one or a few species and it's managed to be optimal for that species or a group of species. In other cases, it's possible that a -- that, for example, a reservoir could be managed for a wider variety of species and so you're trying to balance conditions for -- for a larger number of species. So it all depends on how that particular water body is valued by fishery managers and what their targets are as far as maintaining different game fish populations. 10:01AM 10:01AM 10:01AM

Q And why are -- why are you focused on game fish populations in answering this question? 10:01AM

A Well, I didn't mean to completely focus on it because prey species -- well, first we are talking about managers and I thought you were talking more about fishery-type managers that are looking at water bodies, but it's the -- and for those folks, they tend to look at the sport species, per se. Other people might be looking at non-sport species. The fishery managers would also be interested in is there an appropriate prey base for the game fishes that they're managing the water body for. Those would be typically non-game species, but would be important as far as providing food and appropriate growth for the game species. There may be other water quality managers that are more interested in perhaps indicator species or perhaps species that are -- that are listed species, either in federal or state level that might be important for other reasons, other than game fish or other than prey for game fish. 10:02AM 10:02AM 10:02AM 10:03AM

Q Are you familiar with water quality standards?

A Generally, yes.

Q Have you worked with them often in your profession?

A To a limited degree. For most of the work that 10:03AM

I've done, water quality standards are not -- how should I say it, they're not the real driving force but in some places, some cases I've worked on, the evaluation of water quality standards in comparison with -- with ambient values has been conducted, so it's been part of some work that I've done.

Q With regard to that work where it's -- there's been a comparison of water quality standards to ambient values, did you do that work yourself? Was that part of your responsibility or was that someone you were working with on the project?

A Well, much of -- actually most of what I do is done as part of team efforts. And I think there have been projects that I've worked on where -- where it's parts of the project has been to compare, for example, metals to compare concentrations of metals in surface water bodies with water quality standards. I think most of the work I've done would be in that area and I have worked on some cases and projects where that was the case.

Q Just so I'm clear on it, when -- other than looking at concentrations of metals in surface water, have you worked with any other water quality standards besides standards for metals, I guess, would be my question?

A Well, I'm sure I have. I think I may have worked on some organic substances where there may have been water quality standards. I may have done some work where there -- relative to water quality standards for temperature dissolved oxygen and I've also worked with low sediment quality standards, which are related to water quality standards.

Q Okay. Talk about metals in particular. When you did that work, I saw that you worked at the Coeur D'Alene site in Idaho. Is that one of the sites where you worked with concentrations of metals in surface waters?

A Yes, it is.

Q At that site, did you take water quality samples for metals?

A I did not at that site.

Q Did you analyze water quality samples for metals that were collected by others?

A I believe I did. Although, as I recall, most of my work on that case involved issues with sediments and the toxicity of sediments and the effects of metals on invertebrates in both the Coeur D'Alene River and Lake Coeur D'Alene. I know there was some consideration of the ambient water concentrations but I can't remember the context of that.

Q Can you identify a case where you have done sampling for metals and surface water and compared the results to water quality standards -- surface water quality standards?

A Yes. I think an example of that would be the Montana v. Arco case.

Q And you actually collected water quality samples in that --

A Yes.

Q -- case? And you compared them, the values to water quality standards?

A Yes.

Q Did you make a -- render any opinions regarding whether the surface water met the standards for metals?

A Yes, I did.

Q Did you issue a written report in that matter?

A I'm almost positive I did, although I can't recall the report itself, but I do remember the issues and I'm sure I would have had an expert report for that case.

Q Did you testify in that case?

A Yes, I did.

Q I assume it's in Montana?

A It is, yes.

Q When you were looking at that, do you recall which water quality standards you were applying?

A Well, I remember in that particular case, there were state standards and the issues were metals and surface water was one of the issues in the case. And one of the issues associated with that was should the -- should the state standards be interpreted as compared to the concentration of dissolved metals or should they be interpreted regarding the concentrations of total metals in water samples. And that was one of the issues I was working on.

Q Were you lead on that analysis or did somebody assist you with it?

A I was the lead. I was the testifying expert on that case for the work that -- that we did, yeah.

Q Okay.

A There were other experts also.

Q Sure. Okay. We're going to take a break to change the tape.

THE VIDEOGRAPHER: We are now off the record, the time is 10:10 a.m.

(Following a short recess, proceedings continued on the record.)

THE VIDEOGRAPHER: We are back on the record. The time is 10:21 a.m.

Q Is the Montana v. Arco case, is that a Superfund case, a CERCLA site?

A Yes, it is. 10:22AM
Q Were you retained in that case to do natural resource damage work?
A That's correct.
Q Were there other people working with you on the natural resource damage components of the case? 10:22AM
A Yes, there were.
Q What was your role?
A My role on that was project manager and then ultimately testifying expert. 10:22AM
Q How did you -- were you responsible for conducting the assessment in that case, the natural resource damage assessment?
A No, the natural resource damage assessment was conducted by the State of Montana. 10:23AM
Q And who were you working for?
A I was working for Arco.
Q Was Arco identified as a PRP at the site?
A Yes.
Q And what did you do for Arco at the site? Did you -- well, I'll clarify the question. Was part of your role to review the natural resource damage assessment conducted by the State of Montana? 10:23AM
A Yes, it was.
Q Have you ever conducted a natural resource damage assessment yourself? 10:23AM
A No, I have not.
Q And when I'm speaking of natural resource damage assessment, do you understand I'm talking about that term as it's defined in CERCLA? 10:24AM
A Yes.
Q Did the -- was Montana the natural resource trustee?
A Yes, it was.
Q Did Montana follow the NRD regs in conducting the assessment? 10:24AM
A In that particular case and that was a - that was a state case. There was no federal trustee, as I recall. And I don't believe they were -- they were following the rule. I just don't recall the extent to 10:24AM which they may have followed the rule.
Q Do you recall if that was an issue -- I'm sorry.
A I was going to say that I think that case actually started, as I remember, before the rule was published.
Q What type of site is it? Is it a mining site? 10:25AM
A Yes, it's a very complex large site involving mining operations or concentrating operations and smelting operations.
Q Have you done a lot of work at mining sites?
A What do you mean by "a lot"? 10:25AM

Q Have you worked on more than five mining sites? 10:25AM
A Would you be considering mining and smelting in that or mining meaning a general term?
Q I was going to ask separately about smelting, but you can combine it if you'd like for the answer. 10:26AM
A It may be something on that order, but I don't think it would be too many more than five or six or so at the most and that's considering a combination of mining and smelting.
Q Did the concentrations of metals and surface water at the Montana v. Arco site exceed water quality standards? 10:26AM
A As I recall, yes, they did. There were -- at least in some instances where they did. And the question, as I indicated before, was there -- one of 10:27AM the key questions was associated with this total versus dissolved metals analyses and the degree to which either one of those resulted in an exceedance of the state standards.
Q Was the exceedance of the state water quality standards for metals an injury under NRD? 10:27AM
A Well, according to the Department of Interior rule, it -- that would be an injury under the injury determination phase of the NRDA.
Q And just for clarity, is it accurate -- without regard to whether it's metals or any other water quality standard, is it accurate to say that exceedance of water quality standards is an injury as defined by the NRDA regulations? 10:28AM
A I believe that the DOI rule specifies that an 10:28AM exceedance of a state standard would be a defined injury in the injury determination phase.
Q Okay. And an injury to natural resources?
A I think the way it's phrased it would be an injury to the particular resource that's considered. In other 10:28AM words, if there was an exceedance of a state water quality standard, then that would be an indication that there had been a defined injury to surface water, per se, but only surface water.
Q Okay. So let's take metals as an example. Metals standards are numeric criteria? 10:29AM
A Yes, they are.
Q Are they written to protect any particular use of surface water?
A The -- I'm not aware of all state standards, 10:29AM certainly, but the ones that I'm aware of I think are generally biologically based and they're usually determined by potential toxicity to aquatic organisms.
Q Would it be a numeric criteria to protect a fish and wildlife beneficial use? 10:30AM

A It may be defined that way but the -- the 10:30AM
standards themselves are usually based on toxicity to
either invertebrates, algae, in some cases fish, and
are kind of an integrated toxicity value that would be
based on a variety of organisms. 10:30AM
Q Do you believe that the -- that the -- that an exceedance of a criteria is an injury to the resource that is identified as the beneficial use that the standard is intended to protect?
A Well, I have found that the predictive value of 10:30AM
water, of a water quality criterion or standard has
a -- is fairly uncertain as applied to a -- any
individual water body with it's particular water
quality and biological conditions, so although an
exceedance of a standard is defined in the injury 10:31AM
determination, the important thing to me as a scientist
is what does that mean to the organisms living in that
particular water body. And the exceedance of a
standard may indicate that there is some study
warranted to find out whether or not that exceedance is 10:31AM
actually causing adverse effects on whatever animals
are living in that water body or not. So I don't -- I
don't take exceedance of a standard from a biological
standpoint as absolute evidence that there are adverse
effects. 10:32AM

Q Despite the fact that the regulations define it as an injury? 10:32AM
A That's correct, because remember, I mentioned that
the regulations define it in the injury determination
phase, but the next phase then of an NRDA is the energy 10:32AM
quantification phase, which the rule specifies that any
injury should be quantified in time and space relative
to baseline conditions, based on effects at the
population, the habitat, or the ecosystem level and
defined as a loss of services for that particular 10:32AM
resource.
Q With regard to an exceedance of a water quality standard as an injury, can quantification mean how often and where the water quality standard is exceeded?
MS. COLLINS: Object to form. 10:33AM
A To me, that -- but that doesn't, you could do that
but then that doesn't get at the issue of what is
happening at the population level and has it caused a
reduction in services, either to various biological
groups or to human users of that area. 10:33AM
Q My question is really do the regs permit that type of analysis?
MS. COLLINS: Object to form.
Q I'll re-word it.
My question is really: Do the NRDA 10:33AM

regulations permit that type of analysis? 10:33AM
A They may. And I believe they may, but I don't
recall precisely in the case of -- the case you
mentioned of whether or not they do include that.
Q Can you explain to me what quantification means in the context of the NRDA regulations, injury quantification? 10:34AM
A Well, injury quantification relative to injuries
to biological resources involves the determination, as
I indicated, at the -- at a higher level of 10:34AM
organization on -- which is population or higher level,
on the -- the magnitude of change and the temporal and
spacial degree of change in that particular metric or
that particular variable, whatever it is. It results
in a -- normally in a determination of a -- of a loss 10:34AM
of what are called services compared to baseline in
time and in space for that particular resource.
Q Is the term "injury quantification" defined in the NRDA regulations?
A I'm not sure that it -- it's in the list of 10:35AM
definitions. It's -- I think it's well explained as --
as a step in the overall process.
Q As part of your work on natural resource damage assessments, you've been involved in evaluating trustee's work on selection of restoration options? 10:35AM

A Yes, I have. 10:35AM
Q Have you ever worked on a case involving contingent valuation?
A I have, but I need to say that I only have vague
recollections that -- that parts of cases I worked on 10:36AM
involved contingent valuation, but my work has always
been pretty well separate from work by economists that
are involved in damage determination phase and so I'm
not aware of the -- even the issues or the approaches
that were used, but -- but I believe there may have 10:36AM
been several cases that I've worked on that have
involved contingent valuation.
Q Do you recall those cases?
A Montana v. Arco may have had it. It's been so
long ago I don't remember. There are a couple of cases 10:37AM
I'm working on right now that may involve contingent
valuation but I don't even -- I don't feel like I
would -- should mention them because I'm under very
strict confidentiality restrictions on those cases and
I'm not -- I'm also not sure. There may have been 10:38AM
others of the cases I've worked on but I just can't
recall specifics at this time.
Q The -- I believe you had two cases where you have confidentiality concerns. Do you know for certain whether or not those involve contingent valuation? 10:38AM

A I'm not certain. 10:38AM
Q They're ongoing cases now?
A Yes.
Q Have you ever been involved in the review of a habitat equivalency analysis? 10:39AM
A Yes, I have.
Q And where is that? What site?
A I'm trying to think of the first one. It's -- I'm involved in a number of cases where they are not cases that at this time are in what I would call the 10:39AM litigation phase, they are -- they are or have been involved in settlement negotiations. And as part of those settlement negotiations habitat equivalency has been used as a tool for discussion purposes.
Q Have you commented on those or provided opinions 10:40AM with regard to the -- the quality of the habitat equivalency analysis?
A I have in one particular ongoing case, which is in an active litigation phase and I just can't -- I can't comment on my comments. In most cases where I'm 10:40AM involved in HEA, it's being -- as I indicated, it's been a tool and it's been the subject of discussions but not the production of written reviews and comments.
Q When you're doing work on natural resource damage assessment cases, is your focus limited to impacts on 10:40AM

biological resources? 10:41AM
A It's not limited to that, but I would say that the main focus of my practice has been on biological resources.
Q Okay. What other focus have you had? 10:41AM
A Well, as I indicated on Montana v. Arco, there were issues associated with -- with surface water concentrations of metals.
Q Can I ask a question about that so I don't get lost while you're there? Was that related to the 10:41AM impact on fish or invertebrates?
A Well, that was more as a -- on water quality per se. I also worked on the potential effects on -- on invertebrates and then, well, in the terrestrial environment other -- other organisms on that case, but 10:42AM there were issues associated with surface water as a resource. There may have been some of those issues at Coeur D'Alene, I just don't recall right now, that were under my general purview. I know most of my work was on -- was on invertebrates. 10:42AM
Q With regard to the metals concentrations in the river itself, was the concern with the concentrations related to impact to fish or other aquatic resources or was it related to, say, drinking water? The part that -- the part that you were looking at? 10:43AM

A Yeah, I was and have not, as I recall, been 10:43AM associated with more of what you might call the -- well, the human services kinds of things, like -- like potential health effects or human use of drinking water or things like water contact. So for my purposes, it 10:43AM would have only concerned potential effects on aquatic life.
Q Okay. I'll try to go back to the original question, which was: Has the focus of your work on natural resource damage assessments been primarily or 10:43AM totally focused on impacts to biological resources and you indicated not completely, and so I'm trying to identify what other areas.
A I see. That's why I guess I was trying to separate out the -- what were some water quality 10:44AM effects, even those -- those water quality effects were related to biological resources, there were issues like this total versus dissolved metals concentrations that were separate. I can't think of any other cases where I have, as I indicated, where I've been associated with 10:44AM other, for example, with human uses, except as it might relate to -- to fisheries were directly related to fish, but as far as health-related issues or other human services associated with waters or organisms, that has not been part of my -- my area of work. 10:45AM

Q Okay. I'm going to stretch your memory. I was 10:45AM asking about your experience with water quality standards and surface water earlier and I wrote down four things that you had worked on. One of them was organic substances. What do you mean by "organic 10:45AM substances"?
A I'm referring to substances that contain organic carbon. And that could be things like pesticides, PCBs, dioxins are some of the more frequent ones. Polynuclear aromatic hydrocarbons are another. Some 10:45AM organic forms of metals like tributyltin I've worked with, but a wide variety of substances.
Q Would you be looking at -- when you say "organic substances," are you speaking only of organic substances that might be hazardous substances or might 10:46AM you be speaking of something like total organic carbon?
A Well, I would -- I think where you extracted that term may have been referring more to hazardous substances that are organic compounds.
Q And when you were looking at water quality 10:46AM standards with regard to -- can I call them organic compounds?
A Sure.
Q Were you concerned about -- let me start over. When you were looking at organic compounds 10:46AM

with regard to water quality standards, was your focus on the impacts of those on biological resources? 10:47AM

A I don't recall working with the relationships between organic compounds and water quality standards. My work has been working with those substances and their potential effects on organisms, both aquatic and terrestrial organisms. 10:47AM

Q Can we define biological resources? Could you define that for me in the context that we're discussing it in terms of what you've worked on primarily with regard to NRDs? 10:47AM

A Are you asking me to define the groups of organisms that might fall under that category that I've worked on? 10:48AM

Q That's a little bit more specific than I need. I'm just -- I think it might help the discussion if we define what you mean when you say biological resources generally, in terms of what you've looked at when working on NRDs. Because humans, for example, might be a biological resource so I just want to define what your area of focus has been. 10:48AM

A My area of focus has been on various, I call them, biological groups ranging from -- from invertebrates, fish, birds, mammals, plants. Those are the general 10:48AM

categories that I've -- that I've worked on. 10:49AM

Q Okay. So it isn't accurate to say that what you've worked on has been limited to biological resources that exist in water?

A No, not at all. 10:49AM

Q What kinds of mammals have you looked at?

A I've looked at mammals ranking from small mammals, like mice or moles or shrews or -- a common one that's looked at, to more intermediate-sized mammals like foxes, coyotes, others, to large mammals, which might 10:49AM be deer or elk or other animals.

Q You've looked at the impacts of hazardous substances on those mammals, is that correct?

A That's correct.

Q And plants, have you looked at aquatic plants and the impact of hazardous substances on those? 10:50AM

A I don't recall having -- dealing with aquatic plants as an injured resource and I may be forgetting something, but I just don't -- I can't recall it right now. 10:50AM

Q And so those would be terrestrial plants that you've looked at?

A Mainly terrestrial plants, yes.

Q Okay. Have you looked at -- you indicated that you had looked at water quality standards with regard 10:51AM

to temperature in DO, is that correct? 10:51AM

A Yes.

Q In what context?

A The first thing that comes to mind is work that -- that I've done for -- in the past for EPA. You'll see 10:51AM it referenced on my -- my resumT as far as looking at effects of sewage discharges on various receiving waters. And dissolved oxygen was an issue on those. I think dissolved oxygen, as I recall, was an issue on the work that I did on -- that I mentioned as far as 10:52AM cooling lakes. I've done some work for EPA and for the Corps of Engineers on -- on lakes. One, as part of the clean lakes program and both of those reservoirs were -- there were issues associated with both dissolved oxygen and temperature. That's what comes to 10:52AM mind right now.

Q Were you looking at the effects of dissolved oxygen and temperature in relation to water quality standards to look at impacts to aquatic biological resources? 10:53AM

A That would have been the focus and I -- I have vague recollections about some relationship to water quality, not just looking at DO and temperature per se, but looking at a relative -- certainly in the work for EPA, that there was -- there were comparisons to state 10:53AM

standards. 10:53AM

Q And when you say the work for the EPA, do you mean the clean lakes program work?

A Oh, I'm sorry. I was referring to the -- what's called the 301H work, the work related to sewage 10:53AM discharges.

Q Is that work that you did at the Lafayette Reservoir in California or is that different?

A That's different. That was part of a clean lakes grant. 10:54AM

Q So where was the 301H work done?

A That was a multi-year, multi-faceted project that was -- that involved the review of applications for revisions to -- to discharge permits for marine and estuarian sewage discharges throughout the country. 10:54AM And so it involved sites from New England and south to sites on the -- up and down the Pacific coast and also sites in Hawaii.

Q Was that described in your resumT, that work?

A I would have to check. I believe it is. 10:55AM

Q I'm just checking real quick. Could you help me locate it?

A Sure. Oh, let's see -- oh, here it is. It would be on Page 9-9, about the middle of the page. It's starting "For EPA" and continuing. 10:56AM

Q Thank you. Now, this description says marine sewage discharges. But you also looked at it for -- and I know I won't say this word correctly, estuarine. How do you say the word? 10:56AM

A Estuarine. 10:57AM

Q Estuarine?

A It was marine and estuarine.

Q And does marine mean ocean?

A Yes.

Q When you were looking at the standards for -- water quality standards for marine and estuarine resources, are the same DO and temperature standards in place for those resources as they are for fresh water? 10:57AM

A I don't know.

Q What were you doing in that case, on that project specifically? 10:57AM

A Well, that -- Section 301H of the Clean Water Act allowed municipalities to submit applications to the EPA that would basically relieve them from the requirements to implement secondary treatment of 10:58AM sewage. And the data requirements and the applications were -- were extensive for -- as far as that program for what a municipality would need to show to be relieved of that requirement under the Clean Water Act. After promulgation of that rule, a number of cities 10:58AM

around the country decided to submit very voluminous 10:58AM applications and we, the team that I was working on at the time, I believe that's when it started. It was when I was at Tetra Tech, was retained as the scientific contractor to review all of those 10:59AM applications and provide input in to EPA in their decision-making process on whether to grant the waiver or reject the waiver.

Q Were you looking -- did you review those applications to determine whether or not they would meet water quality standards in the receiving water in the absence of secondary treatment? 10:59AM

A Yes, that was part of the review.

Q Did you also look to see -- did you do any evaluations of what you thought those levels -- let me rephrase that. 10:59AM

Did you do any evaluations of what the impact of the discharge would be on the aquatic resources in the receiving water body?

A Yes. 11:00AM

Q Did you do those analyses on a site specific basis for each of the applications?

A That's correct.

Q Did you do field work to identify and evaluate the impacts? 11:00AM

A In general, no. However, I do recall the 11:00AM collection of some data that we did at one or two sewage discharges in Alaska where there is very limited information, but for certainly the vast majority of cases there was extensive data compiled by the 11:00AM municipalities and so our job was to review that information without collecting anything new.

Q When you were doing the more site specific evaluation of the impacts of the discharge, were you looking at whether the addition of whatever pollutants was at issue would increase dissolved -- or decrease dissolved oxygen levels based on what was already there or what it should have been? 11:01AM

A First, I don't -- if we did conduct studies, and I think we did, I don't recall specifically what we 11:02AM looked at, except I believe that we monitored benthic invertebrate communities, but I don't recall whether we were also looking at water quality measurements. We may have. But the analyses would have been associated with a -- an evaluation of are there impacts or were 11:02AM there impacts at that time of the current discharge conditions which would have been something less than secondary treatment.

Q And just so I make sure that I understand, were you looking at whether the discharge was currently meeting, for example, DO standards? 11:03AM

A That would have been -- are you asking that in a general sense for all of the -- or the specific studies that we may have conducted at one or more sites in Alaska? 11:03AM

Q For all.

A For all. That was part of the evaluation. Although I should say that that was not -- as I indicated in my resumT, my responsibilities on that particular project were to serve as the chief 11:03AM biologist, which was leading a team of biologists evaluating the biological data. But I was working closely with the individuals that were evaluating the physical water qualities and other information associated with the discharge. 11:03AM

Q Okay. Going back then to your work on cooling lakes. Did you evaluate whether discharges from -- were they electric generating plants?

A Yes, they were.

Q Did you evaluate whether discharges from the electric generating plants were resulting in violations of dissolved oxygen standards? 11:04AM

A We may have, but I can't recall specifically. What I do recall is the work being more associated with evaluation of the biological conditions that would 11:04AM

result in these cooling lakes, but it seems to me and it's been a lot of years since I worked on that, that we were also evaluating both temperature and dissolved oxygen regimes that would exist in those impoundments. 11:04AM

Q Did you publish papers on that work? **11:05AM**

A I -- we did reports and I think there may be one paper listed in my resumT associated with that, but most of the information would have been in the reports for EPRI.

THE REPORTER: The reports? 11:05AM

A For EPRI, E-P-R-I.

Q You may have defined that earlier, but what does EPRI stand for?

A The Electric Power Research Institute in Menlo Park, California. 11:05AM

Q Would it be accurate to say then the focus of your work was on assessment of biological -- well, I'm going to just strike that question with regard to the cooling lake stuff.

The clean lakes program work, how many -- were they lakes or reservoirs that you worked on as part of that project? **11:06AM**

A That was just Lafayette Reservoir in California.

Q And did you -- what was the issue at Lafayette Reservoir? **11:06AM**

A The issue there was -- it was a fairly deep lake, it was stratified during the summer. As I remember, I think the hypolimnion became anoxic and there were issues associated with the -- the current biological conditions of the lake. And as I recall, the potential applicability of hypolimnetic aeration as a restoration technique for the lake and what that might -- it's overall feasibility and what that might do to improve the conditions in the lake. 11:06AM 11:07AM

Q You indicate that the lake was eutrophic, is that correct? **11:07AM**

A Yes.

Q What was the source of the eutrophication in Lafayette Reservoir?

A I'm not -- I don't recall. Lafayette Reservoir was a very interesting reservoir in that it had a very -- it's catchment basin was small. It was undeveloped primarily, just native oak woodland in that area. There was water imported to fill the lake from central California that was piped a long ways and it may have been nutrients in that, the water that was piped in to fill the lake. 11:07AM 11:08AM

Q Was it nutrients that was causing the eutrophication?

A Well, I think it was. It was phosphorus, as I 11:08AM

recall, but that lake was not the -- there were not significant adverse water quality conditions in the -- the epilimnion, the upper layers, but the problem at Lafayette Reservoir was the thermal stratification and the anoxic hypolimnion. 11:09AM 11:09AM

Q And why is that a problem?

A It was looked at as a potential problem as far as an expansion that if the hypolimnion could become oxygenated that it could expand total biological habitat in the lake. 11:09AM

Q Explain that to me, please. I didn't mean to say it like that.

A Yeah. Well, as I recall, Lafayette Reservoir, there was just very little oxygen in the deep waters during the summer and so there was -- there was very limited benthic productivity there and there was very limited fish habitat in that area, even though fish populations seemed to be thriving in the reservoir, they were very abundant. During the summer, the fish all lived in the epilimnion or right on the border of the hypolimnion. And EPA, as I indicated, was looking at just the feasibility of using that lake as a candidate for hypolimnetic aeration to be able to oxygenate the hypolimnion. 11:10AM 11:10AM

Q And why did they want to do that, to increase habitat, is that correct or -- **11:10AM 11:11AM**

A As I recall, I can't remember any other reason.

Q What is an anoxic hypolimnion? What does that mean?

A That means there's essentially no dissolved oxygen in the water in the hypolimnion. But I just thought of something else in response to your question, that I think they were also looking at the potential to oxygenate the hypolimnion to decrease phosphorus release from the sediments during that period. So it was both a habitat increase and essentially a phosphorus control mechanism to try to keep the phosphorus more tightly bound in the sediments if they could be oxygenated rather than becoming anoxic. 11:11AM 11:11AM

Q Were they concerned about phosphorus in the sediments being re-suspended into the water column, is that correct? **11:12AM**

A Yes. As I recall, the primary loading of phosphorus to the water column was the phosphorus that was tied up in the sediments in the bottom. 11:12AM

Q How does phosphorus contribute to an anoxic hypolimnion in a reservoir?

A The anoxic hypolimnion can result when there is a -- there are a couple things. One is there's a thermal stratification that essentially isolates the 11:12AM

lower levels of the lake from the upper surface levels of the lake, so you have an isolated mass of water down deep. And there is sufficient production of organic material in the surface layers so that there is essentially some settling organic matter from the layers above that ends up using up oxygen as it settles to the bottom and also just organic sediments use up oxygen. And because that mass of water is isolated from the surface, it can't become re-oxygenated and so the oxygen, as long as there's the stratification in effect, the oxygen can be depleted in that area without any photosynthesis going on because it's down deep away from sunlight and there can be a gradual depletion of oxygen. 11:13AM 11:13AM 11:13AM

Q How does phosphorus contribute to anoxic conditions? 11:14AM

A Well, if phosphorus could contribute -- if phosphorus were to be stimulating phytoplankton growth in the upper layers, that can increase the amount of organic matter that might being settling and moving down into the hypolimnion. 11:14AM

Q Can the -- can the phytoplankton also contribute to decreases in dissolved oxygen in the epilimnion?

A Well, they can at night if there's sufficient phytoplankton that are there and during periods where 11:14AM

there's no sunlight they can use up oxygen in the surface waters if there's enough. 11:15AM

Q When we're talking about phytoplankton in common terms, is that algae?

A Yes, generally microscopic algae that are drifting with the water. 11:15AM

Q And does phosphorus contribute to the growth of any other -- any other type of aquatic organisms besides phytoplankton?

A Well, phosphorus can -- can stimulate the growth of -- of any green plant. It could stimulate the growth of larger what are called emergent plants or macrophytes even that are submerged in the water, large leafy plants. It could also stimulate the growth of attached algae onto hard surfaces. And when I said phytoplankton, I was talking about the small plants that are essentially suspended in the water. 11:15AM 11:16AM

Q Do those other aquatic vegetation and attached algae, can they contribute to anoxic hypolimnion?

A Well, the -- those plants are different in that they're -- they're growing. They're attached so they're growing in the shallower parts of the water body. I suppose that to the extent that if they were -- if they were decaying amounts of those -- of those plants that could find its way down into the 11:16AM 11:17AM

hypolimnion they could, by the decay of that plant material they could contribute, but there would have to be a transport mechanism for them to get to the hypolimnion. 11:17AM

Q The process we've just been discussing with regard to phosphorus contributing to the growth of phytoplankton, attached algae, or other vegetation, can that process increase the volume of the lake that is anoxic? 11:17AM

MS. COLLINS: Object to form. 11:17AM

A Could you repeat it again just so I fully understand it?

Q I absolutely could never say the question again. Does -- does the decaying organic matter that we've discussed, can that contribute to an increase in the anoxic volume of a reservoir? 11:18AM

A There is a relationship between -- all other factors being equal, to the amount of decaying plant material and the degree -- and organic material in general. And that would include sources from outside the reservoir or whatever. Organic material that is -- that can potentially decay, there would be a relationship between the amount of that material and the degree of oxygen depletion in a hypolimnion. 11:18AM

Q Simplistically would it be accurate to say the more organic material, the greater the impact on dissolved oxygen levels in a reservoir? 11:19AM

A I guess if everything else being constant, that there could be a relationship there, that the more decay of organic material that occurred there's a potential, at least, for -- for more depletion of oxygen. 11:19AM

Q Why is -- are dissolved oxygen levels important to fish?

A Well, the simplest response is that fish need oxygen to survive. They need dissolved oxygen to survive with very few exceptions, but most fish depend on dissolved oxygen in the water at some level to survive. 11:19AM

Q Are there fairly well established levels for the concentrations of DO that are important for fish to survive and thrive? 11:20AM

A Well, I know that there certainly are published values. There are -- there have been many studies done dating back to the, gee, probably the '50s or maybe even earlier as far as dissolved oxygen tolerance levels for various species. 11:20AM

Q Are there water quality standards that establish those values?

A Yes. 11:20AM

MS. BURCH: We're going to take a break. 11:21AM
THE WITNESS: Okay.
THE VIDEOGRAPHER: We are now off the record. The time is 11:21 a.m.
(Following a short recess, proceedings 11:21AM continued on the record.)
THE VIDEOGRAPHER: We are back on the record. The time is 11:33 a.m.
Q I think when we left off we were talking about why dissolved oxygen is important for fish and -- and I 11:34AM wanted to ask what types of impact can there be to fish populations when there are low dissolved oxygen levels present in a reservoir?
A If the dissolved oxygen levels are sufficiently low, the -- I guess the most severe impact could be 11:34AM fish kills where fish actually die during stressful periods due to the low dissolved oxygen. If -- if dissolved oxygen were low but not sufficient to cause mortalities, then the -- the low DO could cause reductions in any abundance or the condition of fish if 11:35AM it was at a stressful level but not lethal level, for example.
Q What do you mean by condition of fish?
A The -- the relative weight compared to its length, I guess, would be the most common expression that the 11:35AM

fish may -- may not be growing or developing as they 11:35AM should so they could be in a stressed condition where they just weren't -- weren't healthy from an overall perspective.
Q Can it affect reproduction rates? 11:36AM
A It's conceivable that it could, depending on if there were -- depending on where the -- the low dissolved oxygen levels were and especially relative to the timing of reproductive periods or the timing of early -- of the early life cycles, the existence of 11:36AM eggs or larvae in certain areas, it could be important.
Q Are there any other impacts that you can think of?
A It's -- I guess it's a potential that if the dissolved oxygen levels were sufficiently low and stress the fish to a certain degree, then the fish 11:37AM might be more susceptible to disease or parasites. That's conceivable that it could cause adverse effects. I think that's all I can think of.
Q Okay. Why -- are DO concentrations important to invertebrate populations in a reservoir? 11:37AM
A Yes.
Q Why is that?
A Well, invertebrates -- invertebrates have widely varying tolerances to dissolved oxygen, to low dissolved oxygen, but invertebrates need some level of 11:37AM

oxygen to be able to survive. And if there is very low 11:38AM dissolved oxygen then that will limit the -- the kinds of invertebrates that could live under those conditions.
Q Are there invertebrates that live in places other 11:38AM than sediments in a reservoir?
A Oh, yes, there are.
Q Are the types of invertebrates that live in sediments called benthic macroinvertebrates?
A That's correct. 11:38AM
Q In your report, do you denominate benthic macroinvertebrates as MBI -- or BMI?
A BMI, yes.
Q BMI. How are benthic macroinvertebrates that are in the sediments of a reservoir that experience an 11:39AM anoxic hypolimnion impacted?
MS. BURCH: I'm sorry. Could you read that question again?
(Whereupon, the previous question was read back by the reporter.) 11:39AM
A In the bottom areas, they're in contact with an anoxic hypolimnion. If that condition were to exist, then I would expect there to be fewer kinds and lower abundances of benthic macroinvertebrates than would exist in a -- in the same kind of situation without an 11:40AM

anoxic hypolimnion. 11:40AM
Q In areas which are not affected by an anoxic hypolimnion but may be affected by a low DO concentration perhaps that is not meeting a water quality standard, could there be impacts to benthic 11:40AM macroinvertebrate population?
MS. COLLINS: Object to form.
A Well, that would depend a lot on the nature of -- of the particular water body. The organisms that live in the deeper areas of lakes are generally not as -- as 11:41AM abundant and diverse, let's say, as the benthic organisms that live in the more near shore, shallow environments in lakes. So there's a naturally different community in those deeper darker areas of the lake. And any effects would depend upon, as you 11:41AM mentioned, for conditions that might not be anoxic but might have lower dissolved oxygen levels would depend on the -- the tolerances, the oxygen tolerances of those organisms that might live there relative to the organisms that might be there under higher dissolved 11:42AM oxygen levels, so I can't really answer that in a very general sense.
Q Can lower dissolved oxygen levels result in changes to the make up of benthic macroinvertebrates in those near shore areas over time? 11:42AM

A If the -- if dissolved oxygen depressions were severe enough to stress those organisms or result in mortalities of those organisms, there could be a change in the community structure of benthic macroinvertebrates compared to what would exist there under higher oxygen levels.

Q Is the same thing true with regard to fish populations? Can there be community structure changes as a result of changes in dissolved oxygen levels over time? **11:43AM**

A If -- if those changes were severe enough to actually cause adverse effects in the fish, then that could be manifested as a change in community composition.

Q Do some of the impacts that we talked about earlier, like changes in the abundance or condition of fish, can those changes result in changes to the community structure of a fish population in a reservoir? **11:43AM**

A I guess -- it's conceivable. Everything, as far as effects and whether that particular effect on an individual becomes manifested in the population or community, depends on the severity of the effect on the individual. Natural populations have -- have the ability to compensate for certain levels of effects at

the individual level where you will see no effect with the population and no change in the community, even though there may be some effects at the individual level. But at a certain level, and it's all part of a continuum, where the effect was severe enough at the individual level, then it's conceivable that that effect could become propagated through at the population or community level.

Q I should have done this earlier, but when you're speaking of eutrophication, what does that mean? **11:45AM**

A Eutrophication is the general process of the stimulation of plant growth that results from the addition of nutrients.

Q Does eutrophication, the eutrophication process occur in reservoirs as well as rivers or streams? **11:45AM**

A Yes.

Q What happens in a reservoir when eutrophication occurs?

A When eutrophication occurs, there is an increased growth of plants and usually -- excuse me, but were you asking about reservoirs here --

Q Yes.

A -- as I recall? So the main issue in reservoirs is usually a stimulation of growth of phytoplankton as the result of -- of the addition of what's referred to as a limiting nutrient, something that -- that essentially might have been lower and limiting the growth of phytoplankton, but then with additional nutrient input the phytoplankton then would respond and -- and develop more dense, more abundant populations.

Q And what are the impacts on water quality that result from that eutrophication process?

A Well, the -- I guess the most significant potential effects, if the eutrophication process becomes sufficiently severe, then the ultimate water quality impacts could be low dissolved oxygen, it can be the stimulation of nuisance levels of algae that are either -- that in some cases just cover the surface and color the water. The surface is essentially a green scum. The decaying algae can cause odor problems even and there can be -- can be die offs of fish.

Q Can it result in larger populations of bluegreen algae?

A Yes, it can.

Q When eutrophied water is utilized by a drinking water supply with conventional treatment, do you know whether that can lead to the formation of disinfection byproducts in the finished water?

A Well, there you're getting out of my area of

expertise. I'm not -- I've heard the terms you're using but it's not an area I've studied or that I really know anything about.

Q Are there various levels of eutrophication that are commonly recognized? **11:48AM**

A There are.

Q Can you identify them for me?

A Well, the general levels are oligotrophic, O-L-I-G-O-T-R-O-P-H-I-C, which is if you're talking about an increasing scale here. If I'm starting at the bottom end, so to speak. And the next level would be mesoeutrophic and the next level would be eutrophic and the next level would be hypereutrophic.

Q And is -- just to clarify the scale, is hypereutrophic the most eutrophic class? **11:49AM**

A That's correct.

Q How do you distinguish whether water bodies fall into those four categories?

A Well, there are indices that are used. I think maybe one of the more common ones is called the trophic state index, or TSI, and it's based on chlorophyll-a concentrations in the water. I think that's probably the most common, but there -- I believe there are also evaluations based on -- based on turbidity that come into play and -- and/or dissolved oxygen fluctuations

and other assessments. 11:50AM
Q Have you ever conducted a study of a reservoir to determine its trophic status?
A I can't recall where I've done an original study that was used to classify a reservoir according to its 11:50AM trophic status.
Q Just to clarify, what do you mean by "an original study"? I guess, have you ever done the work that someone relied on for some purpose that classified a lake as the -- classified the trophic status of a lake? 11:51AM
A Yeah. To clarify, that's -- I mean, that's what I meant by I have not done a study where data were collected and subsequently used by myself or another entity to classify a lake.
Q And when you say "to classify a lake," you mean to 11:51AM classify its trophic status?
A Yes. Sorry, I do mean to classify its trophic status.
Q What does eutrophication mean in the context of a stream? 11:51AM
A Well, a stream is a little different situation than lakes because in the eutrophication of a stream, you can have two types of -- of stimulation of plant growth. One would be the phytoplankton, the small drifting plants that I talked about for lakes. But 11:52AM

there's also the potential for stimulation of attached 11:52AM algae, attached plants that grow on rocks or other hard substrates that could increase an abundance.
Q So what kind of -- is that caused by nutrients as well? 11:52AM
A Yes. I'm using the term "eutrophication" here to mean the stimulation of plant growth by nutrients.
Q Is there also a limiting nutrient for eutrophication in streams?
A Typically in fresh waters the limiting nutrient is 11:53AM phosphorus, whether it's a stream or a lake.
Q What kinds of water quality impacts result from eutrophication of a stream?
A Well, if the eutrophication is sufficiently extreme, you can have a reduction in dissolved oxygen. 11:53AM There can be -- as the result of -- of the stimulation of plant growth on the bottom, there could be changes in the benthic macroinvertebrate communities, changes in -- changes in the fish communities as a result of that change in the -- in that basic fundamental habitat 11:53AM of the stream.
Q How does the fundamental habitat of the stream change?
A Well, if you were to contrast a situation where you had, let's say, clean gravel in a stream, that is a 11:54AM

certain kind of habitat and would attract, so to speak, 11:54AM or provide habitat for certain fishes that like to be around that gravel, that size particle, and a certain benthic community that lives associated with that gravel. If there were sufficient stimulation of the 11:54AM attached plants that grow on that gravel, then the habitat changes and there could be different benthic macroinvertebrates then that find that habitat attractive. Maybe more invertebrates rather than -- at one extreme, the invertebrates living there might be 11:55AM the ones that tend to catch their food out of the water column as it drifts by versus at the other extreme where you have that plant growth that I talked about, organisms that tend to -- to feed on the plants, that are attached to the rocks. So there could be different 11:55AM communities associated with that if the change in plant growth was sufficient.
Q Were we just talking about the benthic macroinvertebrate habitat?
A That's correct. 11:55AM
Q What about how does it affect fish habitat?
A In a similar way, although the benthic organisms live in such a direct intimate contact with the substrate that they're probably closer to -- to the situation, but fish also have preferences for the kinds 11:56AM

of substrate in a stream that they're associated with 11:56AM and there are also fish that like to feed on attached algae. So as you progress along that continuum of eutrophication there may be more foods for those species. So it can affect them in the same general way 11:56AM as the benthic macroinvertebrates.
Q Does it become unsuitable habitat for some species?
A It could if there were sufficient -- sufficient plant growth. Some species that prefer, let's say, a 11:56AM clean gravel might find it -- that habitat inappropriate. Other species that prefer to live around more filamentous algae growing on the rocks might be attracted.
Q Can the habitat be impacted in other ways in addition to that by eutrophication? 11:57AM
A In addition to that? In addition to filamentous algae?
Q Yes.
A Well, if -- if the plant growth were extreme, then 11:57AM you could have a reduction in dissolved oxygen in the stream in the same way that you could have in a lake and so the available habitat could be changed then, too.
Q In a eutrophic stream, does dissolved oxygen -- do 11:58AM

dissolved oxygen levels fluctuate during the day? 11:58AM
A I would expect them to. It would depend on the -- well, the depth of the stream and the -- and the -- how fast the water was moving through the system. The more -- if it was a very slow moving stream, I would 11:58AM expect the potential to be more significant than if it was a relatively fast moving stream.
Q Is there any predictable cycle to the fluctuation, i.e., does dissolved oxygen in a eutrophic system tend to be lower at night or higher at night? 11:58AM
A Well, the general trend would be the dissolved oxygen would tend to be higher during the day and then would tend to be lower at night.
Q Is that called diurnal fluctuation?
A Yes. 11:59AM
Q What causes that, that shift?
A It's photosynthesis and respiration. During the day, phytoplankton are photosynthesizing and they're producing oxygen. And at night they're expiring. They and other organisms are using up oxygen, but they're 11:59AM not photosynthesizing, not releasing more oxygen at night so that causes this potential for a diurnal fluctuation that you mentioned.
Q Eutrophication in streams result in fish kill as well? 12:00PM

A If it's severe enough and it depletes the oxygen 12:00PM to a sufficiently low value for a long enough time then it can. Then it can cause mortalities of fish.
Q Can eutrophication result in bluegreen algae in streams? 12:00PM
A Yes, it could.
Q Do you know anything about cyanotoxins?
MS. COLLINS: Object to form.
A Very little. I know that -- I believe that cyanotoxins are toxins released by bluegreen algae, but 12:00PM I've not studied the -- I have not studied them.
Q Do you know whether the toxins produced by bluegreen algae can impact aquatic life?
A Yes. I believe that at sufficient concentrations that -- that toxins released by bluegreen algae can 12:01PM causes mortalities of aquatic life.
Q Does that include both fish and benthic macroinvertebrates?
A I guess -- I believe it does, but I'm more sure of fish than benthic invertebrates. 12:01PM
Q Do you know of any particular cyanotoxin that has the potential to adversely impact fish?
A I cannot recall one.
Q Are there methods for -- standard methods for identifying the trophic status of a stream? 12:02PM

A I'm not aware of the methods for a stream, the 12:02PM methods that may apply to a stream.
Q Are there these four divisions that we discussed earlier with regard to reservoirs which -- reservoirs which are applicable to streams? 12:02PM
A They very well may be.
Q Do you know whether the TSI, the trophic state index, is applicable to streams?
A I don't know if that's used for streams or not.
Q Are there any water quality standards that are 12:02PM specifically designed to look at eutrophication in streams? I'm going to rephrase that because I don't know what "look at" means.
Are there any water quality standards that are specifically designed to address eutrophication 12:03PM in streams?
A Well, I believe there are, but I'm not familiar with all of them. But -- but in most areas there are -- there's I think what are called in Oklahoma "beneficial use analyses" that look at various -- 12:03PM various categories of beneficial uses of streams and lakes, too, for that matter. And there are determinations made as far as whether or not those -- those beneficial uses are being supported and their -- includes various categories associated with fish and 12:04PM

wildlife protection and human contact and other 12:04PM categories.
Q Where would I locate the beneficial use analysis that you're referring to?
A Well, the ones that I've seen are -- are produced 12:04PM in a -- what I'm familiar with are an annual series of reports produced by the Oklahoma Water Resources Board that indicate for each one of those beneficial uses whether or not they're being supported for various water bodies throughout the state. 12:04PM
Q I'm -- I see. Do you know whether there are water quality standards dealing with eutrophication in streams?
A I'm not -- I'm not aware of that.
Q Do you know whether there are water quality 12:05PM standards dealing with eutrophication in reservoirs, specifically Lake Tenkiller in Oklahoma?
A I'm not aware of the specifics, no.
Q Can eutrophication, the eutrophication process that occurs in a reservoir result in changes to the 12:05PM community structure of the fishery?
A When you say "the community structure of the fishery," are you referring to the community -- the community structure of the fishes or when you say "the fishery" it means what people are catching. 12:06PM

Q I mean the fishes. **12:06PM**
A Okay. Well, my answer would be the same as before is that if -- if eutrophication is severe enough along a continuum, then the community that exists under a higher eutrophic state, let's say, can be different 12:06PM than the community that would exist at a lower eutrophic state.
Q Would you expect to see a different population make up of fishes in a eutrophic lake as opposed to a oligotrophic lake? **12:07PM**
A If all other things were equal for this -- for these two hypothetical lakes, it is possible that the fish community could be different in a eutrophic lake than in an oligotrophic lake, let's say.
Q Is there a make up of fish populations that you 12:07PM will expect to see in a eutrophic lake?
A It all depends on -- on how eutrophic that lake is. If the lake were highly eutrophic, I would expect to see higher abundances probably of what are classified as more tolerant species by various 12:08PM classification schemes. When compared to a lake very low on the trophic scale where I might see higher proportions of what are termed intolerant fish species.
Q Would you expect to see -- let's use Carlson's trophic state index as our guide on levels of eutrophic 12:08PM

conditions. In the example that you just spoke of, 12:08PM when you were saying very high, were you referring to hypereutrophic conditions or eutrophic conditions?
A Well, I don't think that I could put an exact boundary on it. As I said, it's a continuum. The 12:09PM people have put boundaries on some of these things according to four -- four or five classifications, whatever, according to, for example, in Carlson's TSI at certain cut-off points, ten to 20 and 20 to 30 and 30 to 40 and 50 or above I think it is, but it's -- 12:09PM that in itself is just not going to, you know, or at least -- and I don't know of precise cutoffs for what the fish communities might look like under those various situations. All I can say is that there -- there may be a gradual response and when you get near 12:10PM the ends of that continuum, I could probably predict what the differences in fish community structure might be, but to try to cut it down any narrower than that, I don't have the knowledge or tools and I don't know if it's out there as far as being able to predict what 12:10PM that fish community might look like.
Q When you were talking about more tolerant species with regard to eutrophication, what do you mean by that?
A Well, I mean there are -- there are tolerance 12:10PM

categories that have been developed and published in 12:10PM the literature. As far as the tolerance of fish for changes in both water quality conditions and the tolerance of fish relative to habitat changes. And investigators, and including some folks from Oklahoma, 12:11PM have taken a look at the fish that live in their area and they've just assigned a range of tolerance values typically ranking from, at one extreme -- at the bottom of the extreme, intolerant fish, which just have a very narrow range of tolerance, which like a certain water 12:11PM quality and a certain habitat type. And they can't -- they just can't tolerate changes in those very much. Usually there's a moderately intolerant range and then a moderately tolerant category and then a tolerant category at the other end of the range. Usually four 12:11PM categories, as I recall. And it's based on professional judgment, usually of the investigators, on what is known about the habitat and water quality requirements of those species.
Q When these judgments about the tolerance of the 12:12PM species are made in their -- and they're evaluating changes in water quality, are they made based on their tolerance to particular types of water quality problems?
A It's -- the sense I get is that dissolved oxygen 12:12PM

plays a large part in -- as far as that water quality 12:12PM tolerance classification. There may be some other factors in there, perhaps turbidity, too, but it's -- it's at least driven in a large part, from what I've seen, by dissolved oxygen. 12:13PM
Q And habitat changes. I mean, how is that -- how is that evaluated for these tolerance rangings?
A That has more to do with the tolerance to a variety of factors that might be associated with sedimentation, riparian vegetation, stream flow 12:13PM conditions. I think those are the main ones. There are usually a couple more that may be considered, but the nature of the riparian areas and the nature of the sediments and the general flow characteristics are important. 12:13PM
Q So in Oklahoma, when -- you're saying that that has been done in Oklahoma, are you referencing a publication by Jester?
A Jester, et al.
Q Jester, et al. Were these -- were these 12:14PM tolerance -- were there four categories of tolerances that were identified in the Jester report?
A As I recall, I think there were. It was as I described them.
Q Can these tolerances be different based on the 12:14PM

particular water body at issue? **12:14PM**
A Well, are you asking me, for example, in a fish classified as intolerant one water body might have another classification in another water body?
Q Yes. **12:15PM**
A I don't know the answer to that, if it could change. I know that -- I think that what Jester, et al, did, as I recall, was that the authors put their heads together and used a consensus assessment of what they thought the appropriate tolerance level should be 12:15PM and they're not -- they're not always agreeing, but I think using a consensus approach like that is an appropriate way to do it since it is based on professional judgment.
Q Were the tolerance levels that were developed in the Jester, et al, research and publication based on regional specific studies? **12:15PM**
A I don't recall.
Q What was -- what was the purpose of this Jester, et al, research? Was it intended to be used for regulatory purposes? **12:16PM**
A I don't recall the purpose, if one was stated.
Q Do you know whether it's used currently for any regulatory purpose?
A Well, I believe that the -- as part of the index 12:16PM

used to evaluate fish communities as parts of the BUMP 12:16PM process, the beneficial use process, that the proportion of -- of intolerant species is one of the indices, as I recall, that's used in that. So it would -- to the extent that that's a regulatory 12:17PM program, then I believe it would be used in that.
Q Do you know whether it's a regulatory program?
A No, I don't.
Q Do you know whether that -- that particular index is a water quality standard? **12:17PM**
A No, I don't.
Q Does the designation of particular fish as moderately tolerant mean that that particular species will not be impacted by changes in DO?
A No. I mean, it's possible that even if a fish is 12:18PM categorized, let's say, as moderately tolerant, I think that was your question, that you could have dissolved oxygen levels sufficiently low that it could still be affected.
Q Is the same thing true about species designated as tolerant? **12:18PM**
A Yes.
Q Does the presence of an intolerant species mean that DO levels are adequate to support all species?
A I don't think you could say that. I just -- it 12:19PM

says what it means, that just that the presence of 12:19PM those species indicate, based on the species that are categorized, that species that are there that have a relatively low tolerance for water quality changes and that there could be species out there, for example, 12:19PM that are even more sensitive. So it doesn't mean necessarily that it's protective of everything, but it just provides a valuable indication if you have a high percentage of -- of intolerant species that the water quality conditions are not -- not adverse to those 12:20PM species which are classified as being relatively sensitive to changes.
Q How do you develop the percentages? I mean, how do you know if a percentage of intolerant species is high or low? **12:20PM**
A That's a matter of -- I don't know that there are any absolute criteria there, so it's just a matter of looking at it and seeing if it's -- if it forms any kind of a significant proportion of the population. It could be on a -- on some kind of a scale. 12:20PM
Q If a -- if a species is listed as intolerant, does it mean that it's intolerant to DO and turbidity or just one of the two variables?
A I don't recall how, how -- if and how Jester, et al, may have described that. It's been some time since 12:21PM

I saw the publication. 12:21PM
Q When you were doing this work, did you attempt to identify which species that were identified as intolerant what they were in particular intolerant to based on Jester's work? **12:21PM**
A No, I did not go further into each individual species as far as its tolerance.
Q Did you identify any species based on Jester's work that were intolerant -- that were listed as intolerant to phosphorus? **12:22PM**
A No.
Q What about in any of the other categories, moderately tolerant?
A No, not relative to phosphorus itself.
Q I had the same sort of question about the habitat changes. Based on Jester's work, could you distinguish whether something was rated as tolerant or intolerant or something in between based on any particular type of habitat change? **12:22PM**
A I don't recall that kind of information being in 12:22PM Jester, et al. But as I said, it's been a while since I looked at the document.
Q Those two things, changes in water quality and habitat changes, are they combined to come up with the tolerance rating? **12:23PM**

A As I recall, Jester, et al, had separate -- 12:23PM
separate categorizations for each of those two
categories.
Q Believe it or not, this conversation started as a result of questions that I had about you working on 12:23PM Lake Lafayette in California. You worked for EPA in that case?
A Yes.
Q And what were you asked to do specifically? What was your role? 12:23PM
A Well, it's been some time. I think what we were
asked was to compile what was known about the lake,
biological and water quality conditions, and we also
conducted studies of the lake, both benthic communities
and fish, and water quality measurements. And we wrote 12:24PM
a report and I think in that report we were -- we were
evaluating the potential feasibility of hypolimnetic
aeration, although I do not recall the details of what
we concluded.
Q Did you produce that report to EPA? 12:24PM
A Yes.
Q Do you still have a copy of that report?
A I don't believe I do.
Q Do you recall what the name of it is, the report?
A No, I don't. 12:24PM

Q Which EPA region did you submit it to? 12:25PM
A Let's see, I don't think it was an EPA region. As
I remember, we were -- the contract that we were
awarded to do that came out of the ORD, Office of
Research and Development, in Corvallis, Oregon. 12:25PM
Q Did you work with Dr. Sullivan on that project, Tim Sullivan?
A No.
Q Have you ever worked with Dr. Tim Sullivan on anything? 12:25PM
A No, I haven't.
Q Did you identify any issues with biological conditions in Lafayette Lake as a result of eutrophication?
A Well, it's casting back a number of years but one 12:26PM
thing that sticks out in my mind was the -- there were
fairly high populations of a particular fish species
that feeds on phytoplankton that had been introduced in
the lake and those fish seem to be doing very well as a
result of fairly high phytoplankton abundance. But I 12:26PM
just can't recall the data, any other findings or
results or anything else.
Q You don't recall whether or not there were any impacts to the fish or benthics in Lafayette as a result of eutrophication? 12:27PM

A I just don't remember what we found. It would be 12:27PM
in the report.
Q Can you identify any matter you have worked on involving evaluation of temperature and surface water body in relation to water quality standards? 12:27PM
A Could I refer to my resumT?
Q Absolutely, that would be great.
A Could you rephrase the question again, please?
Q Can you identify any instances where you've worked with temperature in surface water bodies in relation to 12:28PM water quality standards? Can I -- we're going to run out of tape here in a second and probably break for lunch. Can I ask you a follow up question and we'll come back to that one after we come back from lunch?
A Okay. 12:28PM
Q Do you recall with the Lafayette Lake project whether you did any evaluation of the effectiveness of hypolimnetic aeration addressing DO concerns?
A I believe we did and I believe it was part of our
report, but I can't remember what we concluded as far 12:29PM
as its applicability or whether it was ever
implemented. I don't know.
Q Did -- oh, you don't know if it was ever implemented?
A I don't. 12:29PM

Q Also on your resume you make reference to some 12:29PM work that you did on hypereutrophic conditions in the Upper Klamath Lake in Oregon. I believe that was on Page 3-1 and 2 of your report.
A Mm-hmm. 12:29PM
Q What kind of work did you do there?
A That work was for -- I believe that was for the
Corps of Engineers and we were evaluating what was
known about the lake, the available information on --
on the biological conditions in the lake and the 12:30PM
nutrient sources to the lake and -- and I think it had
a restoration component to it associated with a
determination of whether or not any identified nutrient
sources were controllable and, if so, what might that
mean to a changing eutrophic status in the lake. 12:30PM
Q Did you publish a report on that?
A I think a report was published. We were actually
doing that work as a subcontractor to another firm
and -- but I think there would have been a report at
the end of it. 12:31PM
Q Who were you the subtractor for? What firm?
A I don't recall the name of the firm. It was
not -- it was a very small, small local firm in Oregon.
Q And can you tell me what region, the Army Corps of Engineers region you submitted -- the report would have 12:32PM

been submitted to? **12:32PM**
A You know, I'm thinking back on this and there was work with both the Corps and with BIA, the Bureau of Indian Affairs. They were heavily involved in it because the lake is surrounded by the Klamath tribal 12:32PM lands and I don't know whether the report went to BIA, if there was a report, or it went to the Corps and I don't believe I have a copy, but that's all I can remember.
Q Okay. We'll probably follow up on that when we get back. **12:32PM**
THE VIDEOGRAPHER: We are now off the record. The time is 12:32 p.m.
(Following a short recess, proceedings continued on the record.) 1:37PM
THE VIDEOGRAPHER: We are back on the record. The time is 1:37 p.m.
Q When we left off we were talking about work you had done on, I believe, is it called Klamath Lake?
A Upper Klamath Lake. 1:38PM
Q Upper Klamath Lake. Is that in Oregon?
A Yes.
Q Did you retain any documents that would reflect the work that you did on Klamath Lake?
A I don't recall having any that I've retained. 1:38PM

There may have been some in the company files at that 1:38PM time, but if those were around they would have been archived someplace.
Q And that was -- you said you were at Tetra Tech at that time, is that right? You might not have said that. **1:38PM**
A I mentioned Tetra Tech, I think, in the context of Lafayette Reservoir.
Q Ah.
A I would have to check the date on that one. 1:38PM
Q Is there someplace in your resume where those dates would be reflected? Is there a paper published or anything like that?
A I don't -- and I don't think that there was -- I think that would have been Tetra Tech to the best of 1:39PM my -- it was -- it would have been in the early 1980s.
Q Okay. What specifically was your individual role on that project?
A I seem to think that I was the senior biologist working on that project. I don't think I was the 1:40PM project manager, as I recall. And there were others working on it, water quality specialists, lake restoration specialists, that were part of the team.
Q And what specifically was your work on the project? **1:40PM**

A I think it was compiling and reviewing the 1:40PM available biological information on the lake and then working with the -- with the project team to develop a report and arrive at any overall conclusions.
Q Were you asked to render any opinions on the impacts to biological communities from the eutrophic status of the Klamath -- Upper Klamath Lake? **1:41PM**
A I may have been. I would -- I assume that that would have been part of it.
Q Do you recall whether you reached any opinions about whether there were impacts to fish or benthic macroinvertebrates in the Upper Klamath Lake? **1:41PM**
A I just don't remember our conclusions.
Q Do you recall what -- what type of analysis was done to identify sources of nutrients in the watershed? **1:41PM**
A The best of my recollection is that -- that we were looking at concentrations of nutrients in various tributary streams and looking at that loading to the lake.
Q Was it in relation to identified sources or land use, do you recall? **1:42PM**
A Well, there's a considerable amount of agricultural land use around the lake and some rivers that I recall are -- are major sources of the nutrients that flow through those areas but that's all I can 1:42PM

remember. 1:42PM
Q Do you recall what type of agricultural operations are present?
A No, I don't.
Q Do you recall how the concentrations of nutrients in tributary streams and evaluations of loading are used to assist in the identification of sources? **1:43PM**
A No, I don't.
Q Did you do any of that work yourself?
A No, that would have been the primary 1:43PM responsibility of others, although I was involved in the team and developing overall conclusions.
Q Did you -- were you involved at all in the identification of responses that might be taken in terms of remediation? **1:43PM**
A Well, I seem to remember being part of discussions after we had assembled all the data, reviewed what was known about the lake, and then reaching decisions as a team as far as what the sources were and whether or not there were -- were restorative or controlled mechanisms 1:44PM that might be used. I just can't remember what those conclusions might have been.
Q Did you say restoration?
A I think we were looking at both in-lake restoration alternatives and as well as source control 1:44PM

options. 1:44PM
Q What was the nutrient that resulted in the eutrophication in the Upper Klamath Lake?
MS. COLLINS: Object to form.
A I don't recall the specifics. 1:45PM
Q Do you recall whether phosphorus loading was identified as an issue contributing to eutrophication in the watershed?
A I'm sorry, I just don't have the details in mind on it and if I was to venture something, it would just 1:45PM be purely a guess.
Q Other than the work on Lafayette Lake and the Upper Klamath Lake, have you worked on any other lakes in terms of dealing with the effects of eutrophication on biological resources? 1:46PM
A Well, one that I can think of but -- although eutrophication was not a major focus, the focus was more on toxic substances, but we also did some limited work on eutrophication in isolated areas and that was in Lake Baikal in Siberia. 1:46PM
Q Can you spell the name of the lake?
A Oh, sorry. B-A-I-K-A-L.
Q Did you actually get to go to Siberia?
A Yeah. I've been co-leader of two expeditions to Lake Baikal. 1:47PM

Q Did you do any assessment of the sources of nutrients to Lake Baikal? 1:47PM
A Only in a very general way as far as one particular tributary that appeared to be a source of nutrients and hazardous substances in one part of the 1:47PM lake, but that was all.
Q And what did you do to identify sources in that tributary?
A We didn't -- we only identified that tributary as a potential source, but we did not look any further on 1:47PM that tributary.
Q What was the nutrient of concern that you were looking at?
A We were looking at both the potential effects of nitrogen and phosphorus that could -- that could be 1:48PM associated with this river, which is a fairly industrialized river. And looking at, as I said, mainly towards the presence of hazardous substances, but also any evidence of -- of eutrophication in isolated areas due to that -- that particular 1:48PM tributary.
Q Was that related in some way to the concern with the -- with metals, the interest in eutrophication?
A No, it was more associated with evaluating the -- I guess, more the filtering effects of the large delta 1:48PM

associated with that river and whether there was 1:49PM evidence that both either the nutrient or hazardous substances were making it through that delta into Lake Baikal proper or were they being essentially filtered out. 1:49PM
Q Was there an issue with eutrophication of the lake itself?
A It is an issue, although as you may know, it's a very, very large lake, the largest lake in the world, the deepest lake in the world, but there are isolated 1:49PM parts of it where there has been concern as far as the localized effects of nutrient inputs.
Q And what specifically are the concerns related to eutrophication in the localized area?
A For Lake Baikal it's primarily associated with a 1:50PM decrease in water transparency. It's a very, very transparent lake as far as the clarity of the water.
Q Any concern about impacts to biological communities?
A I don't recall ever seeing anything like that. 1:50PM
Q How does eutrophication result in a decrease in water transparency?
A Well, through the -- through the stimulation of phytoplankton growth and increased particulate matter in the water column. And, therefore, lower light 1:50PM

transmissivity. 1:50PM
Q Do you know whether there are any water quality standards relating to water transparency?
A I think there may be, although I don't recall any specifically. 1:51PM
Q Did you evaluate those standards in this case at Lake Tenkiller?
MS. COLLINS: Object to form.
A No, I did not.
Q In this particular case, did you do any sampling yourself in the case of Lake Baikal? 1:51PM
A Oh, yes, I did.
Q Did you do biological sampling?
A Yes, I did.
Q Was that biological sampling associated with evaluating the effects of eutrophication? 1:51PM
A We collected some data along those lines, but most of our effort was on hazardous substances, both in sediments and in biological tissue.
Q Can you identify any other projects that you worked on involving eutrophication? 1:52PM
A Could I refer to my resumT?
Q Yes.
A And your question, just to be clear, specifically was associated with lakes or rivers? 1:52PM

Q Lakes or rivers. 1:52PM
A Not in the marine environment?
Q Well, we'll start there.
A Okay.
Q Then with lakes and rivers? 1:52PM
A Okay. There is one project that's on Page 9-10 about the middle of the page, says, "Project co-manager and principal investigator for review and analysis of biological impact data" -- oh, I'm sorry, it's not that one, it's the one under, "Principal scientist to 1:53PM evaluate responses of benthic invertebrates and fishes to lake aeration and circulation projects."
Q Who did you do that work for?
A I think that work was for EPA.
Q And was it your responsibility to work on the design of the project? 1:54PM
A No, it wasn't. Mine was looking at the biological data to do an evaluation of how benthic invertebrates and fishes responded to lake aeration when a project was implemented. 1:54PM
Q Was that at multiple locations?
A As I recall, yes, it was to try to collect all the available information for lake aeration applications and -- and develop a consolidation and summary and synthesis of that information. 1:54PM

Q Were you collecting existing data or collecting your own data? 1:54PM
A That was a sampling of existing data.
Q Do you recall how many locations you reviewed?
A No, I don't. 1:55PM
Q What kind of responses did you see with regard to benthic invertebrates and fishes to lake aeration and circulation?
A I don't recall.
Q Did you issue any reports to EPA? 1:55PM
A Yes, I'm sure we did.
Q Do you recall which -- which office or division of EPA you prepared the report for?
A I think this was also for the Office of Research and Development in Corvallis. 1:55PM
Q What period of time was this in? Was this in the '80s or --
A I think this would have been early 1980s, around 1980 or '81, '82 possibly.
Q Did you -- in those projects, did you do anything to evaluate the eutrophic status of the lakes you were evaluating? 1:56PM
A We may have, but I don't recall any specifics.
Q Do you know whether lake aeration and circulation projects have ever been documented to be effective mitigating impacts to either benthic macroinvertebrates or fish? 1:56PM
A It's been some time since I've looked at this information, but I seem to recall in general there were some examples of situations where hypolimnetic aeration 1:56PM had been successful or at least partially successful at providing an oxygenated hypolimnion.
Q On that same page, the next entry, it relates to Lafayette Reservoir and then there's one that follows that says "evaluated the response of benthic invertebrates and fish in lake aeration and circulation programs and developed recommendations for applicable lake restoration techniques." Is that a different project than the one we've just been discussing? 1:57PM
A Boy, they sound very similar and it may be a repetition of the same project that persisted through some change in my resumT. 1:57PM
Q Do you recall what recommendations you made regarding applicable lake restoration techniques?
A No, I don't. 1:58PM
Q Were there any other projects that you worked on related to eutrophication of streams or reservoirs?
A I don't think there are.
Q Let's talk about projects to -- to look at eutrophication in the marine environment. Have you been involved in a number of projects related to that? 1:58PM
A I think the primary project would be the 301H application review. It's not a eutrophication project per se, but as part of the review, there was an evaluation of phytoplankton assemblages near sewage 1:58PM discharges, as well as water quality conditions. So the project was fairly broad ranging from potential effects of -- of toxic substances in a sewage discharge to potential stimulatory effects of nutrients in those discharges. 1:59PM
Q Does the eutrophication process follow the same pattern in a marine environment that it does in a reservoir?
A Well, there can be differences in -- usually phosphorus is not a limiting nutrient in the marine 1:59PM environment and there's more concern for the discharge of nitrogenous waste in marine discharges than there are for fresh water discharges, but eutrophication, as a process, follows a similar pattern as the result of nutrient stimulation. 2:00PM
Q Do you get impacts on DO levels in marine environments?
A There could be.
Q I think -- I think we haven't covered this but we were starting to. Looking at temperature issues in 2:00PM

surface waters and in comparison to water quality standards, and I guess I would like to know whether you've worked on any projects which have compared temperatures in surface waters to water quality standards for temperature? 2:00PM 2:01PM

A While I was employed at NYU Medical Center, I was doing some work at -- for a number of utilities in the northeast around existing power plants. And as part of that, I was reviewing available information, both biological and water quality, around those power plants and providing consulting advice on their situation with regard to their discharge. And I think -- I remember specifically dealing with a lot of biological data, but I think I also was evaluating some of the temperature data for the receiving waters of those power plants and some of them were on rivers -- I don't think any were on lakes, but fresh water rivers -- and evaluating compliance with -- with state standards for temperature, although I don't remember any of the details. 2:02PM 2:02PM 2:03PM

Q Do all states have water quality standards for temperature?

A I don't know.

Q Do you know whether Oklahoma has water quality standards for temperature? 2:03PM

A I'm not aware of it. 2:03PM

Q Sediments. Have you done any work evaluating sediment in surface water in relation to water quality standards?

MS. COLLINS: Object to form. 2:03PM

A I don't recall any work. And I assume in your question you're talking about the relationship of suspended sediment to water quality standards?

Q That's a subset. I'm asking a fairly broad question. Specifically, any sediment, water quality type issues, with relation to water quality standards. 2:04PM

MS. COLLINS: Object to form.

A Well, with that very broad question, I have done a lot of work with sediments that contain hazardous substances and there are, in many cases, joint issues as far as the sediments being either a source or a sync for substances and the relationship between those sediments, bottom sediments I'm talking about here, and overlying water quality. 2:04PM

Q Could you define what you mean by source and sync? 2:05PM

A In regard to bottom sediments?

Q Yes.

A What I mean is the -- the issue of whether or not sediments are basically a -- are being deposited from the settling of suspended sediments or alternatively whether those bottom sediments could be eroded periodically and be a -- essentially a source for suspended sediments into the water column. 2:05PM 2:05PM

Q When those eroded sediments are a source of suspended sediments in the water column, would there also be the potential that the metal or the hazardous substances that you were looking at would be present? 2:06PM

A That -- there is a potential, yes.

Q And I think that's what I was trying to understand was when you were talking about sources and syncs, I guess I understood it in terms of a source of the hazardous substance that you were involving or a sync for the hazardous substance that you were looking at. Is that a correct understanding of how you're using the term? 2:06PM 2:06PM

A But I was not referring to what you might call the, you know, the proximal source of, let's say, a metal of its original release or facility source or non-point source or whatever, but I was purely talking about the dynamics within the water body itself, and the potential for deposition or release of those sediments and any associated hazardous substances. 2:07PM

Q Okay. And would a sync be -- when sediments are a sync would that be an instance where that hazardous substance comes to be located in the sediments and stays there at least for some period of time? 2:07PM 2:07PM

A Yes.

Q And when sediments are spoken of as a source, is that when -- a situation when the hazardous substance is released from those sediments? 2:07PM

A Yes, either released from the sediments or released by the sediments being re-suspended and redistributed in the water body.

Q Is that a cycle that occurs throughout a water body? Does that -- I'll ask it like that. 2:08PM

A Well, it's very water body specific. In some cases there are areas where sediments are very stable, it's a depositional environment. There are others, either through natural processes or through human induced factors, those sediments can be re-suspended and redistributed. 2:08PM

Q Are there any -- in the context of a reservoir, are there any water quality issues that can facilitate the release of hazardous substances from sediments back into the water column? 2:09PM

MS. COLLINS: Object to form.

A Yes, there are.

Q Can dissolved oxygen levels affect the likelihood of release of hazardous substances into the water column? 2:09PM

A Yes. 2:09PM
Q How does that work?
A Well, you can have changes in the absorption of metals on to sediments in the bottom of a reservoir that is dependent on the -- what's called the redox 2:09PM potential or the amount of oxygenation that's occurring and metals can go through cycles of being absorbed on to sediments or tending to be released from those sediments based on the amount of oxygen that's present.
Q Does that process occur with regard to phosphorus in sediments? 2:10PM
A Yes, phosphorus can undergo the same kinds of changes.
Q So narrowing the question to suspended sediments in the water column, have you evaluated any water quality impacts associated with suspended sediments in the water column in relation to water quality standards? 2:10PM
A No, I don't recall that I have.
Q Do you know whether there are any water quality standards for sediments, suspended sediments? 2:10PM
A I -- I have been aware of some in the past but I don't know the details of what those are.
Q Can suspended sediments in the water column impact fish in a reservoir? 2:11PM

A Yes. 2:11PM
Q How does that occur?
A Well, it's through a couple different mechanisms and this is if suspended sediments are sufficiently high, they can affect fish by -- by what I would call 2:11PM direct means. They can essentially clog the gills and affect respiration of the fish so it's more of a direct toxic effect. They could also -- suspended sediments can affect, especially if they're at sufficiently high concentrations and they're settling out, could affect 2:12PM things like spawning habitat availability. If suspended sediments were sufficiently high as to limit light transmission in the water, in theory at least, they could -- they could reduce primary productivity and even benthic productivity by settling out on 2:12PM benthic organisms and reduce the food supply for certain fishes.
Q Can suspended sediments in the water column contribute phosphorus to the water column?
A In a very general sense my answer would be yes, 2:12PM although I don't -- I don't understand all the dynamics associated with phosphorus absorption onto sediment particles so I couldn't -- I couldn't say with any certainty or specificity to what degree that process would be important. 2:13PM

Q Did you evaluate any issues with sediment, suspended sediments in the water column in Lake Tenkiller or any of the streams in the Illinois River Watershed? 2:13PM
A No, I did not. 2:13PM
Q When I use the term "streams in the Illinois River Watershed," do you understand that I'm referring to the -- the Illinois River, Flint Creek, Barren Fork, Caney Creek and any tributaries thereto?
A Yes. 2:13PM
Q I just want to make sure I don't have to say river and stream and deal with stream order.
A I understand.
Q Okay. Did you evaluate temperature data in Lake Tenkiller? 2:14PM
A No, I didn't. I didn't evaluate the temperature data. I may have had some -- I may have had some references to it to a limited degree, but I don't recall in that section of my report but there is no detailed evaluation of the temperature regimes. 2:14PM
Q Did you evaluate dissolved oxygen in Lake Tenkiller?
A The answer would be similar. No, I didn't do an overall evaluation of what the dissolved oxygen levels are. 2:15PM

Q Did you do any evaluation of phosphorus levels in Lake Tenkiller? 2:15PM
A No, I did not.
Q Did you do an evaluation of DO levels in the streams of the Illinois River Watershed? 2:15PM
A No, I did not.
Q Did you evaluate phosphorous levels in the streams of the Illinois River Watershed?
A No, I did not.
Q Did you evaluate phytoplankton or attached algae in either the stream -- streams of the Illinois River Watershed or on Lake Tenkiller? 2:15PM
A No, I did not.
Q Did you evaluate nitrogen levels in either the streams of the Illinois River Watershed or Lake Tenkiller? 2:16PM
A No, I did not.
Q When I asked you with regard to the streams and Lake Tenkiller about whether you had done an evaluation of phosphorus levels, I meant to include both concentrations as well as loads. Did you look at either concentrations or loads of phosphorus in any part of the Illinois River Watershed? 2:16PM
A No, I did not.
Q Did you look at chlorophyll-a levels in Lake 2:16PM

Tenkiller or the streams of the Illinois River Watershed? 2:16PM

A No, I did not.

Q Did you evaluate AHODs in Lake Tenkiller?

A And what are AHODs? 2:16PM

Q AHOD is a -- is short for aerial hypolimnetic oxygen demand?

A No, I did not.

Q Did you do any evaluation of bacteria levels in the Illinois River Watershed? 2:17PM

A No.

Q Did you -- have you ever worked with water quality standards in Oklahoma prior to your involvement in this case?

A Yes, I did have a project a number of years ago 2:17PM that involved work for the Oklahoma Water Resources Board and it was providing some guidance to the board on the development of site specific water quality criteria for metals.

Q Were those site specific criteria designed for protection of the fish and wildlife beneficial use? 2:18PM

A I think they were, but I don't have a specific recollection of that and of the -- of what they were designed for.

Q Were you retained by the Oklahoma Water Resources Board for this work? 2:18PM

A As I recall, they were the client.

Q Do you recall who you worked with at the Water Resources Board?

A Yeah. The one name that comes to mind, it's been 2:19PM some time, is Derek Smithee. And I think there was one other individual, but I'm drawing a blank on that.

Q What year was this, do you recall?

A Rough guess would be late 1980s or it could have been 19 -- early -- very early 1990s. 2:19PM

Q Was the guidance related to the development of site specific criteria for metals a general advice or was it related to a specific watershed?

A No, that work for the board was general guidance.

Q Had you done work like that before for any other states or the EPA? 2:20PM

A I don't recall doing any work for that for any other states. Within the State of Oklahoma, we had been doing some work on the Chikaskia River relative to site specific -- development of site specific water 2:21PM quality. I believe it was for cadmium. And I think that our subsequent retention by the Water Resources Board might have stemmed from some of that work that we were doing within the state at the time.

Q And the work on development of a site specific criteria for the Chikaskia River, was that on behalf of an industrial client? 2:21PM

A Yes, it was but I don't recall the name of the -- of the client at this time.

Q Do you recall if it was for a smelter site? 2:21PM

A I think it was.

Q Was it in -- do you recall if it was located in Blackwell, Oklahoma?

A Yes, I do.

Q And was it? 2:22PM

A It was.

Q Okay.

A Yes.

Q Did you develop a recommendation for a site specific criteria for cadmium in the Chikaskia River and submit that to the Water Resources Board? 2:22PM

A I believe we did.

Q Did you do that work yourself?

A I did it as part of a team but I was -- was a key person in that group. 2:22PM

Q Were you looking at the -- the level of cadmium in relation to their impacts on fish or benthic macroinvertebrates?

A That's correct.

Q Do you know whether that recommendation for a site specific criteria was accepted by the Water Resources Board? 2:22PM

A I don't know.

Q Do you know whether the guidance on developing site specific metals criteria was accepted and followed by the Water Resources Board? 2:22PM

A I don't know what either.

Q Other than that, have you worked with water quality standards in Oklahoma on any other projects?

A I did some work around the same time at 2:23PM Bartlesville and I think we were dealing with some issues there, too, but I have very vague recollections of that project.

Q Was that a Superfund site that you were working on, do you recall? 2:23PM

A It was a hazardous waste site, I don't know if it was a Superfund site.

Q Do you recall what the hazardous waste was?

A Well, I'm thinking it was metals, but -- but I don't remember the specifics. 2:23PM

Q Do you know whether there is an antidegredation policy that applies in the Illinois River Watershed?

A No, I don't.

Q Do you know whether there are any numeric water quality standards that apply in the Illinois River 2:24PM

Watershed? **2:24PM**
A The only one that I've heard mentioned, and I don't know the specifics of the application, is a -- is a phosphorus value of .037 milligrams per liter that is, I think, part of the scenic rivers criterion. 2:25PM
Q I'm not sure if my question went to narrative criteria.
A Oh.
Q But is that a narrative criteria as you understand it? **2:25PM**
A Oh. Well, I guess I would call that a numerical criteria.
Q Are you aware of any other numerical criteria that apply in the Illinois River Watershed?
A Well, to the extent they're state water quality 2:25PM standards, I would assume that those apply, but I'm not aware of the specific values.
Q Are you aware of whether there are any numeric standards that apply in the Illinois River -- let me rephrase. **2:25PM**
Are you aware of whether there are any narrative water quality standards that apply in the Illinois River Watershed?
A No, I'm not.
Q What are water quality standards? **2:26PM**

A "Water quality standards" are values that are -- I 2:26PM guess they can be -- they can be narrative, in other words, words or they can be a number that are adopted by states to be able to determine the quality of surface water of the state, whether or not they are 2:26PM exceeded.
Q Are the standards adopted by or approved by the Environmental Protection Agency?
A Well, I think in many cases the state -- numerical state standards are the result of adoption of the EPA's 2:27PM water quality criteria and the incorporation into state standards.
Q But do you know whether the water quality standards applicable in Oklahoma have been approved by the Environmental Protection Agency? **2:27PM**
A Oh, no, I'm not aware of that.
Q How do water quality standards relate to the Clean Water Act?
A I can't answer that.
Q Do you know what use support assessment protocols 2:27PM are in Oklahoma?
A I'm not sure I know exactly what you mean, if -- I just don't understand what you mean by the term.
Q Have you ever heard that term before, use support assessment protocols? **2:28PM**

A Well, I'm thinking about the -- the protocols that 2:28PM go into the -- the beneficial use assessments that are in Chapters 45 and 46, I think, of the code and I'm aware of those, but I'm not sure exactly what they're called. 2:28PM
Q Okay. Let's talk about the protocol in Chapter 45 and 46 that you're making reference to. What is the purpose of those protocol?
A The purpose is to evaluate various surface water bodies in the state and evaluate whether or not they 2:29PM are supporting or not supporting various categories of beneficial uses.
Q Who uses those protocols?
A I'm not sure who actually uses them. The Water Resources Board publishes them, but I am not sure how 2:29PM they're used.
Q Do you know whether or not those protocols are intended to be used in doing the beneficial use monitoring reports?
A Well, if my understanding is correct on what the 2:30PM protocols are, I believe that those are what is followed to develop the findings presented in the beneficial use reports.
Q Do you know whether they are intended to be used for any other purpose? **2:30PM**

A No, I don't. 2:30PM
Q Which of these protocols in particular are you familiar with, all of them, or did you become familiar with any particular subset of the protocols for your work in this case? **2:31PM**
A The one that I -- the one that I'm familiar with relative to my work in this case is the fish and wildlife propagation category.
Q And had you worked with that protocol prior to your work in this case? **2:31PM**
A No, I had not.
Q Did you consult anyone at the Oklahoma Water Resources Board about how to apply that protocol?
A No, I did not.
Q Are there other protocols in Chapters 45 and 46 2:31PM that you were familiar with other than your work in this case?
A No.
Q So the protocol related to the fish and wildlife propagation category, what is that? What is the 2:32PM protocol?
A The protocol, as I remember, it's a -- it's a method for evaluation -- of the primary determination is it's an evaluation of -- well, the fish community data that are collected at that site and information on 2:32PM

certain water quality variables to evaluate whether or not that particular use is supported or not. And there is a score developed that's compared with a standardized range to determine whether that use is supported. 2:32PM 2:33PM

Q Is there a name of this protocol?

A I don't recall.

Q What types of fish community data do you look at in employing this protocol?

A There were, I think, six different fish metrics and included in that were taxa richness, diversity, the number of sunfish taxa, the number of or the percentage of intolerant species, and the proportion of tolerant species. Those are the ones that I can remember. 2:33PM

Q Does this protocol apply to streams and lakes? 2:34PM

A Yes. There are -- there are determinations made for both streams and lakes.

Q Are there different evaluations you do for a stream as opposed to a lake?

A I believe there are but I can't -- I can't recall the differences. 2:34PM

Q Did you apply this -- this protocol to Lake Tenkiller?

A No, I did not.

Q Did you apply it to any streams in the Illinois 2:35PM

River Watershed? 2:35PM

A Yes. I calculated that the fish IBI to -- for the streams that were monitored by the state in 2007.

Q When you say "the fish monitored by the state in 2007," did you use all of the data collected by the State of Oklahoma in 2007 when you did your calculation? 2:35PM

A I used the fish data collected by the state.

Q All of the fish data collected by the State of Oklahoma in 2007, is that right? 2:35PM

A Well, I used the data that were available to me that were produced by the state. I don't know if that was all the data.

MS. COLLINS: Are you referring to the data in this case or the entire State of Oklahoma for all BUMP reports. 2:36PM

MS. BURCH: I'm referring to any data collected by the state at all.

A Oh, well, let me clarify that. I used the data files that were developed for the 35, I believe it was, sampling stations that was collected in 2007 for this case. 2:36PM

Q What is a fish IBI?

A That is a score that is a -- that represents a summary of the variables that I mentioned to you previously. 2:36PM

Q What does IBI stand for?

A It's Index of Biotic Integrity or Biological Integrity.

Q Have you ever calculated an IBI score using this methodology in any other location? 2:37PM

A I don't believe so.

MS. BURCH: Okay. Let's go ahead and take a break right here.

THE VIDEOGRAPHER: We are now off the record. The time is 2:37 p.m. 2:37PM

(Following a short recess, proceedings continued on the record.)

THE VIDEOGRAPHER: We are back on the record. The time is 2:48 p.m. 2:48PM

Q What water quality variables are involved in the protocol from Chapters 45 and 46?

A I recall that turbidity is involved. I believe that DO is involved and there may be others.

Q Did you use turbidity data and DO data from the Illinois River Watershed when you calculated the fish IBIs? 2:48PM

A No, I did not. I looked at just the characteristics of the fish community.

Q I think you might have answered this already but 2:49PM

just for clarification, did you look at any other protocols applicable to the fish and wildlife propagation category under Chapter 45 or Chapter 46? 2:49PM

A None other than the fish metric.

Q Have you worked with IBIs before in doing evaluations of fish impacts? 2:49PM

A I have in the State of Ohio for some work that I did there a number of years ago.

Q Did you use an IBI to evaluate impacts to fish?

A As I recall, yes, comparing IBIs at various points in a stream system and with some reference values. 2:50PM

Q With whom did you do this work with -- for?

A It was for a company associated with a -- it was a metal processing or refinery facility but I don't recall the name of the company. They were undergoing bankruptcy at the time and I don't think they exist any longer. 2:51PM

Q Were you looking in that case at water quality variables as well as fish community variables?

A As I recall, we were looking at concentrations of metals in sediments and water in addition to the biological data. 2:51PM

Q What fish community metrics did you evaluate in that IBI?

A I don't remember. 2:52PM

Q Did you follow a standard protocol? 2:52PM
A As I remember, the State of Ohio had a protocol and it was in accordance with that protocol.
Q Do you know whether other metrics are used in IBIs besides the six that are associated with the Chapter 45 and 46 IBI? 2:52PM
A Yes, I'm aware of there are some applications. I can't give you specifics, but I'm aware of other metrics -- the use of other metrics in other various IBI calculations. 2:53PM
Q Can you identify some of the other metrics that might be used? Let me narrow the question, too, with regard to streams.
A Oh, well, the proportion of lipophilic individuals is one. I think there are other -- the proportion of 2:53PM individuals that count for 75 percent of species and I'm sure there are others.
Q Are you aware of any instances where IBI metrics are developed specifically for the watershed that's being evaluated? 2:54PM
A No, I'm not.
Q How many other instances of applications of IBIs are you familiar with?
A Well, I've read of the applications in the literature. I can't give you the specific sites. As I 2:55PM

indicated, I haven't worked on any other sites other 2:55PM than the one I mentioned that have used IBIs.
Q Did you read about these applications of IBIs in the literature in preparation for your work in this case? 2:55PM
A No. Through other -- for other reasons, although I don't recall whether I may have looked at some in preparation for this case or not.
Q I'm going to ask you about your employment history. I'm curious about that. That would be reflected in your expert report. And actually, before I go to that, I'm going to finish your educational background. It looks like you have a master of science in biological sciences specializing in marine biology from Oregon State University in 1971, is that correct? 2:56PM
A That's correct.
Q And marine biology, is that the study of biology in the ocean?
A It is.
Q And then you have a bachelor of science in fishery science from Oregon State University in 1968? 2:57PM
A That's correct.
Q And fishery science, was that focused on marine environments or fresh water environments or both?
A That's both. 2:57PM

Q After you received your bachelor of science in 1968, did you go directly to pursuing your Master's? 2:57PM
A I did.
Q Were you employed at that time?
A Yes, I was. 2:57PM
Q And how were you employed?
A I was employed during -- well, a significant part of that three-year period you mentioned there by the X-ray Science and Engineering Laboratory at Oregon State University where I was a full-time employee doing 2:58PM research and radiological physics. And I was effectively working on my master's degree in my spare time.
Q What is radiological physics?
A Well, it is the physical interactions of -- of 2:58PM radiation, of both -- things mainly associated with my work it was mainly X-rays, in looking at the interactions of X-rays with tissue and especially the intensity of scattered radiation resulting from various therapeutic and diagnostic X-ray procedures. 2:58PM
Q And how long were you -- were you employed at the X-ray Science Lab?
A I believe that was probably two-plus years during that period of 1968 to '71.
Q And after 1971 how were you employed? 2:59PM

A I was employed then by New York University Medical 2:59PM Center.
Q And you were there until 1977?
A That's correct.
Q And you obtained your dissertation during that time period -- I mean, your Ph.D. during that time period as well? 2:59PM
A Yes, I did.
Q After you received your Ph.D., where did you go to work? 3:00PM
A Well, after I received the Ph.D., I did stay on for -- for a relatively short time, less than a year, at NYU Medical Center continuing to do research. And then I accepted a position with Tetra Tech Consulting firm in Lafayette, California. 3:00PM
Q And was that in 1977?
A Yes.
Q And what did you do for Tetra Tech?
A Let's see, a significant part of the time was associated -- during that period in the first, let's 3:00PM say, two to three years, was associated with the development of models, both models that would predict the response of -- of organisms to the impingement and entrainment at power plants. And then models to evaluate the ecosystem level effects of power plant 3:01PM

operation of any mortalities that -- or changes in -- 3:01PM
in communities that would result from those acute
effects. And that included some work I think I
mentioned earlier about the development of models, too,
to predict the responses of cooling lakes to -- to the 3:01PM
operation of power plants. And it was about that time
that I also did the -- the Lafayette Reservoir study
that we discussed.
Q Was that your primary responsibilities while you were at Tetra Tech? 3:02PM
A Well, only for the first couple of years. And
then in 1979, I was with Tetra Tech but I -- I moved
with a couple of other individuals to start a new
office in Seattle for the company and then that was
about the time that I initiated the work for EPA on the 3:02PM
301H program that we discussed. And then sometime
after that move, I also was project manager for a -- a
major study for the U.S. EPA Region 10 to conduct
various water quality and sediment studies in Puget
Sound at -- and some of the major industrialized 3:03PM
embankments in Puget Sound. And that project went on
for several years until -- until the at least mid
probably 1986-87, in that range.
Q When you were looking at Puget Sound, what specific pollutants were you looking at? 3:04PM

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A It was mainly associated with hazardous substances 3:04PM
and substances that -- and especially contaminated
sediment sites in Puget Sound. And looking at -- at
potential effects on -- on benthic organisms, on fish
and plankton and the development of monitoring plants 3:04PM
and implementation of some data collection efforts to
assess the conditions in some of those urban
embankments.
Q In particular, what hazardous substances were you looking at? 3:05PM
A Oh, a whole series of metals, all the usual --
usual ones, including arsenic, mercury, copper, lead,
zinc, cadmium, PCBs were an issue, PAH, some
pesticides, mainly DDT, phthalates, some chlorinated
phenols. That's the main list. 3:05PM
Q And were you doing surface water quality monitoring yourself?
A I don't recall that we were doing any surface
water quality monitoring, it was mainly associated
with -- what I can remember is sediment sampling and 3:06PM
sampling of -- of biota fish and invertebrates.
Q Did you have a reference area for that work?
A Yeah, we had several, as I recall.
Q What reference areas did you use for this work?
A Oh, boy, the main one that I remember was a place 3:06PM

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called Carr Inlet and I think we had, C-A-R-R, and I 3:06PM
think we may have had multiple sites in Carr Inlet.
And I think there may have been others that -- I'm sure
there were, that I just don't recall the names of them
at this time. 3:07PM
Q Was there any industrial influence on Carr Inlet?
A Relatively little. These were -- these studies
were assessments of not a particular, not focused on
any particular industry or industrial activity but they
were -- the goal was to look at more the integrated 3:07PM
effects of industrialization on these waterways so that
the goal there was to look at a reference area that had
relatively little industrial development.
Q And was this site, this area ever designated as a Superfund site? 3:08PM
A Oh, the areas that I was looking at?
Q Mm-hmm.
A Yeah. There were -- part of the overall
industrialized embankments in Puget Sound is
Commencement Bay. Commencement Bay was one of the top 3:08PM
ten NPL sites originally designated under the passage
of CERCLA and then much later the lower -- what's
called the Lower Duwamish Waterway was designated as a
Superfund site. That's the area right near the City of
Seattle. 3:08PM

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Q To your knowledge, did the U.S. EPA ever initiate any actions to hold any of the sources responsible for the contamination? 3:08PM
A In Commencement Bay they did and they are in the
process at the Lower Duwamish site. 3:09PM
Q Do you know whether they identified all of the sources of the industrial hazardous substances in Commencement Bay and pursued action against all of the sources?
A Boy, I don't know about all of the sources. I 3:09PM
know that in Commencement Bay there is a -- a very long
list of PRPs and there has been settlement of some
parts of that. Hylebos Waterway, H-Y-L-E-B-O-S,
Waterway there have been -- there's been settlement
with many of the PRPs for that subunit of the 3:09PM
commencement of a Superfund site and there are ongoing
negotiations with many other PRPs and many in the other
four or five areas of Commencement Bay.
Q To your knowledge, did EPA undertake to separate out which contributions came from which PRP? 3:10PM
A Yes.
Q In the entire Commencement Bay?
A I don't know that it's been done in the entire
Commencement Bay, but within Hylebos Waterway, I'm
aware of -- of those kinds of actions, yes. 3:10PM

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Q And how is that -- how is that done in Hyle -- how do you spell that? 3:10PM

A H-Y-L-E-B-O-S, Hylebos. How was it done you're asking me?

Q Yes. 3:11PM

A Well, there was -- there's been a lot of work done on that in allocation subsequent to any of my involvement in Commencement Bay, but -- but in general from what I've seen, it's done by a number of factors of looking at the distribution of -- of contaminants in 3:11PM the vicinity of a particular facility, especially as it relates to any known discharges or releases of that particular substance. And drawing -- drawing a track between a potential release point. There's some, for example, release points associated with -- there's one 3:12PM area called the Hylebos Ditch and looking at what was released at a particular site and then taking samples at various locations along a potential transport route to be able to document that particular substance at a facility at a release point and then at various 3:12PM transport points down a pathway. And then in the receiving water body, as in the case of Hylebos, and then also looking at the patterns of distribution of that substance in the water body itself. I think that there were -- there was other ancillary information and 3:13PM

there was other -- there were folks that worked on it 3:13PM on just relating potential mass emissions of and use of various substances relative to what's found in the very near field, more industrial-type applications that I'm really not aware of all of that. 3:13PM

Q Did you -- do you know what the term "joint and several" liability means?

A I think I do, although it's, I think, more of a legal regulatory term but I think I know what it means.

Q Do you know -- what do you think it means? 3:13PM

A I think it means that if you are shown to be a contributor to -- to an adverse effect for an injury or associated with a release of hazardous substances, even though you may be one of many, that you can be held liable for the entire potential liability for the site. 3:14PM

Q Is there a joint and several liability under CERCLA?

MS. COLLINS: Object to form.

A Well, I'm not a regulatory specialist but I've heard that term under CERCLA mentioned many times and 3:14PM so I believe there's some kind of applicability of joint and several liability under CERCLA.

Q Do you know why U.S. EPA is pursuing an allocation at Hylebos Bay?

MS. COLLINS: Object to form. 3:15PM

A Well, and I should clarify that the -- the 3:15PM allocation work that I'm more familiar with, it was -- it was done jointly as part of the R-I-F-S and subsequent studies by both the Washington Department of Ecology and U.S. EPA. And then -- then there was 3:15PM extensive continuing work as far as allocation on the natural resource damage claim as part of Hylebos Waterway. So there have been various sequential activities there since about the mid 1980s.

Q Do you know why the -- the EPA and the State of Washington and the trustees are looking at allocation in Hylebos Bay? 3:16PM

MS. COLLINS: Object to form.

A My understanding and my understanding is as a scientist, not someone involved in the regulatory 3:16PM aspects, is it was used as a method to be able to allocate the clean up responsibilities and the ultimate agreement on natural resource damages among the various potentially responsible parties in that area.

Q Was it used in the context of a settlement? 3:16PM

A Yes, it was.

Q What was -- who were you working for? You were working for U.S. EPA Region 10 in Hylebos Bay, is that correct?

A I was actually working for -- the lead agency on 3:17PM

it was Washington Department of Ecology so when I was 3:17PM retained, I was project manager for the RIFS done by the state at Commencement Bay.

Q The whole RIFS, the entire project?

A The original Commencement Bay RIFS. 3:17PM

Q Did you ever do any work on the natural resource damage assessment in Hylebos Bayor Commencement Bay?

A Yes, a little bit of work. As part of a team for part of that assessment, but that work was -- was very confidential and I really -- I can't say any more 3:18PM except that I did have some involvement for one of the PRP groups for one of the operable units in Commencement Bay.

Q When was that -- when were you retained to do that? 3:19PM

A I think that would have been about 2005, 2006, in that range.

Q So I'm just trying to get an idea of the work that you had done at Tetra Tech after 1979 and we've talked about the 301H program and then now this Puget Sound work. Is there any other major work that you did at Tetra Tech -- I don't know how long you were there. How long were you there? 3:19PM

A I was there from 1977 to 1987.

Q So were there any other major projects that you 3:20PM

can identify that you worked on while you were there? 3:20PM
A There was another major project for EPA and that project was for EPA headquarters. The Office of Marine and Estuarine Protection, I think it was called, OMEP. And we, Tetra Tech, were a national contractor for 3:20PM assisting them in developing a wide range of activities and documents, including the development of a -- a national database repository for marine and estuarian environmental data. We provided guidance documents on various assessment techniques and I can't even remember 3:21PM all of them, but it was -- I think we did one on evaluation of fish histopathology, we did one on general statistical sampling design, and did a number for this particular office at EPA of their guidance documents that they could use to support their 3:21PM programs.
Q And you did a lot of that work yourself?
A Yes.
Q Where did you go after 1987?
A In 1987, along with four other individuals, we 3:21PM formed a company called PTI Environmental Services.
Q And you were at PTI Environmental Services until 1997, is that correct?
A That's correct.
Q And you were a vice president and a principal at 3:22PM

PTI Environmental? 3:22PM
A That's correct.
Q What projects did you work on while you were at PTI Environmental?
A Could I refer to my resumT to refresh my memory? 3:22PM
Q Yes. The most painless way possible for you and me is fine.
A Well, in -- after the formation of PTI, originally I was continuing to do some -- some of the same PTI work that we've talked about. Under the original 3:23PM organization of PTI, we were divided into two -- the company was divided into two divisions, a government services division and a private client division. And I was the director of the government services aspect. Shortly after the formation, I do recall starting work 3:23PM for NOAA, the National Oceanic and Atmospheric Administration, on doing some very early work for NOAA as a trustee on their planning of the natural resource damage cases. And we were contracted to do initial evaluations of information for NOAA at various sites 3:24PM and provide them guidance on environmental conditions and the evidence for injuries to natural resources at those sites.
Q Now, was this prior to the development of the NRDA regulations? 3:24PM

A Well, this would have been in the very late '80s 3:24PM so it was after the original publication of the DOI rule.
Q And NOAA, NOAA is the trustee?
A NOAA is a trustee, yes. 3:24PM
Q And what is NOAA a trustee for?
A NOAA is a trustee for marine and estuarian areas on all coasts of the U.S., as well as the Great Lakes. They're a co-trustee in the Great Lakes area. And for -- for parts of rivers that may be -- there would 3:25PM be migratory species, even though they may be in fresh water parts of rivers, but on migratory species for which NOAA would have trusteeship. In other words, that would -- that would spend some of their time in the ocean. 3:25PM
Q Okay.
A So also in the early days of PTI then after a couple years, we talked about the Montana, the Arco case, so I started working on that. There are several other NRD cases. I'm not sure when some of these 3:26PM started because there would have been a transition between PTI and Exponent, but I was doing some work on the Duwamish River in Seattle. At PTI, I was retained by the Department of Justice on the U.S. v. City of San Diego case and that was a major involvement for 3:26PM

some time. 3:27PM
Q Who was your client on the Duwamish River?
A That's Boeing.
Q Now, just to -- so I can understand, the whole -- were you director of governmental services the whole 3:27PM time you were at PTI or did that change at some point?
A It changed because we reorganized along different lines than government versus private clients, and so I became director of the biological operations at -- at PTI, whether they be government or private. And 3:27PM another individual was directing physical, chemical, more engineering-type operations.
Q And director of biological operations, can you help me define what that is?
A Well, I was basically in charge, even though I 3:28PM wasn't -- I was in charge of the staff, all the biologists, ecologists, and ecotoxicologists reported up to me and I coordinated their involvement in various projects involving biology that the firm was doing.
Q At some point, did work on natural resource damage 3:28PM cases become a primary focus of yours?
A I would say a significant focus, probably starting with -- well, starting with the Montana v. Arco. My work for NOAA prior to that had been, I would say, relatively minor as far as my time was involved. But 3:29PM

with the retention on the Montana case, then my work in NRD started to increase as far as the percent of my time being spent on it.

Q Were there other NRD cases that you worked on while you were at PTI? 3:29PM

A You know, it's hard for me to -- to relate to some of these cases to the transition -- excuse me, in 1997 to Exponent because I know a number of them were ongoing and then transferred over, so there were some but I don't have dates on these in my resumT so I don't have a real good division point on that. But I would say most of the cases you see listed on my resumT here have been -- were Exponent cases and a few of them were started under PTI and then transitioned over to Exponent. 3:30PM

Q After you began working more on natural resource damage assessments, and when we're using that natural resource damage assessments, are you referring to CERCLA natural resource damage assessments?

A Not always. I mean, I have worked on -- on several that were -- that were not CERCLA sites. 3:31PM

Q Were the natural resource damage assessments conducted under a different statute?

A Yes, in some cases, Clean Water Act. And I've also worked on groundwater cases that were entirely 3:31PM

state cases under state groundwater law. 3:31PM

Q Natural resource damage assessments under state law?

A Mm-hmm, yes.

Q Just groundwater cases under state law or any other cases? 3:32PM

A No, one other -- at least one other case I can recall.

Q Was it a surface water case?

A Surface water and terrestrial ecosystems. 3:32PM

Q When you were looking at natural resource damage assessments under state law, did you employ the DOI NRDA regs in your analysis?

A Well, my -- of course, my analyses are not, as I explained before, in doing the NRDA, my work has been working for defendants so -- so I'm operating in a framework that -- that they chose mainly for the -- for the NRDA, although in many cases there's certain -- there's certainly relevance, there's certain aspects that have, you know, a state case that may be pursued were they're complying with the federal rule, but that's not always the case. 3:33PM

Q Do the NRD DOI regulations apply to Clean Water Act natural resource damage assessments?

A I think there's some regulatory reference there 3:34PM

and the -- although the regulation is the same for CERCLA, are not mandatory for a Clean Water Act case or -- nor a case on CERCLA, but they may be used if trustees choose to use them. 3:34PM

Q Just so I'm clear on this. The DOI natural resource damage assessment regulations are not mandatory to be followed in conducting a natural resource damage assessment, is that correct? 3:34PM

A That's my understanding.

Q In your experience representing defendants in natural resource damage assessment cases, how often do the trustees strictly follow the natural resource damage assessment regulations by DOI? 3:34PM

MS. COLLINS: Object to form.

A I don't know that I could give you a -- an estimate of how often because in some cases they seem to be followed fairly rigorously. In other cases, they may be followed partially, but there are certain components that are not followed. And then as I said, I've been involved in -- in some cases where they're not followed at all. But my experience is in dealing with trustees on a number of these cases that what I usually hear from the trustees, even if it's settlement negotiations, is we want this settlement negotiation to proceed according to the federal rule and we're going 3:35PM 3:35PM 3:36PM

to follow those steps and I frequently hear that. 3:36PM

Q When you say you frequently hear that the settlement would follow the federal rule, is that the same thing as saying that the natural resource damage assessment will follow the federal rule? 3:36PM

A Well, it is because the assessment is done essentially in concert with the settlement discussion, but it's just done on a more cooperative basis than it would be if it was just a litigation situation where a lawsuit was filed. Both sides and the plaintiff then developed their case independently and the defendants developed their defense independently. In many of these ongoing cases that I'm involved in, the process is one of a -- I use cooperative in quotes because it's not entirely cooperative, the trustees still have the -- the fundamental authority on their side, but there is an attempt for the PRPs to work with them and to go through the steps to go through negotiating what the assessment plan would look like and developing it and then talking about what individual studies might be done and then cooperatively conducting those. And then going right on through injury assessment, injury quantification, and damage determination following the steps and the procedures and the various public notifications that are specified as part of the 3:36PM 3:37PM 3:37PM 3:38PM

process, I think, so that if things do fall apart at some point down the line, trustees have told me that they still have been following the rule and they can go their own way and have a full blown NRDA in accordance with the rule if settlement discussions fall apart. 3:38PM

Q And what's the benefit of having an NRDA to a trustee that follows the rule exactly?

A I think their main benefit is rebuttable presumption.

Q What is a "rebuttable presumption"? 3:38PM

MS. COLLINS: Object to form.

A Yeah, and I'm throwing around a legal term here as a biologist, but my understanding of that term is that if a trustee has rebuttable presumption in accordance with following the rule to the letter, that the burden 3:39PM of proof is essentially shifted to the defendant to prove that they're wrong, you know, rather than more the burden being on them to prove that they're right in their claim.

Q How many cooperative assessments have you been 3:39PM involved in that are completed that have followed the NRD regulations?

MS. COLLINS: Object to form.

A There's so many that are ongoing. The -- I identified the Saginaw River/Bay. There, those 3:40PM

discussions were done in -- in a framework of the -- of 3:40PM the rule. The -- the St. Lawrence sites have been done in a framework of the DOI rule. The Duwamish, those are -- not all of those are finally settled but they have been progressing a long ways. So many of these 3:41PM goes on a long time. The -- I've worked on the Hudson River NRD case there. It's not -- I would not call that a cooperative one necessarily, but it is strictly following the rule. The Tittabawassee and Saginaw River/Bay in Michigan. 3:41PM

Q Is that different than the Saginaw River/Bay?

A Yeah, those were two separate cases. The Tittabawassee River/Bay is identified as a separate case and it is separate, a separate PRP, separate substances. That is a cooperative assessment that is 3:42PM following the rule.

Q Could you spell the first word?

A Oh, yeah, sorry, T-I-T-T-A-B-A-W-A-S-S-E-E.

Q Ongoing?

A Yes. Those are the ones that, at least the ones 3:42PM that I have listed here that, that I can recall.

Q And is the Saginaw River/Bay NRDA a complete process? Is it done?

A Yes, it is.

Q And it strictly followed the NRD regulations? 3:43PM

A I wouldn't use the word "strictly" because I think 3:43PM one might always find aspects that are not in accordance with the rule. There's a lot of information in the rule, as you know, but I'm talking about sites, I guess, that some of them follow much more strictly 3:43PM than others, but -- but were generally following the framework of the rule.

Q Is the St. Lawrence NRDA complete?

A No, it's not.

Q Do you know whether the rule was strictly followed 3:43PM in the St. Lawrence NRDA?

A No. And I haven't -- I wouldn't be in a position the say that the rule was strictly followed in any of these because there always could be something as far as the many provisions that -- where the federal rule was 3:44PM not followed, but the basic outline of the rule and the development of assessment plans, the quantification of injury, the determination of damages and along the lines of the many -- of the base line considerations in the rules, the evaluation of causation, those aspects 3:44PM are being followed. And as I said, the public notification, the development of things like the assessment plan, the publishing of the assessment plan, and on through the process.

Q But you would anticipate with regard to, for 3:45PM example, the St. Lawrence NRDA, there may be parts of the NRDA regulations maybe related to injuries, determination, quantification, or damages that weren't strictly followed?

MS. COLLINS: Object to form. 3:45PM

A No, I wasn't thinking so much of that, but I was thinking more of there could be procedural aspects associated with the rule that the -- that may be trustee responsibilities that weren't completely followed, so I'm distinguishing between the framework 3:46PM of the rule and those various major steps and ending up with an estimate of damages and some of the -- for example, a pre-assessment screen is specified in the rule and there are many aspects of a pre-assessment screen that are specified. And -- but that is a 3:46PM document that trustees maintain confidential and so I don't know that that was followed or not, but that's a first step in the whole process.

Q Okay. Let's stop here to change the tape.

THE VIDEOGRAPHER: We are now off the record. 3:46PM The time is 3:46 p.m.

(Following a short recess, proceedings continued on the record.)

THE VIDEOGRAPHER: We are back on the record. The time is 3:57 p.m. 3:57PM

Q How many natural resource damage assessments have you worked on? 3:57PM

MS. COLLINS: Object to form.

A I don't know if I have the count in my mind, but I would estimate that it's probably been 25 or so. 3:57PM That's a rough guess. I haven't actually tabulated them.

Q Are all of those for defendants?

A Yeah, with the exception of -- of some of the work that I did very early on for NOAA, all of my work on 3:58PM natural resource damage assessments has been for defendants.

Q How many of those natural resource damages have had published reports of assessments?

A Well, most of them have been cases -- have been 3:58PM settlement discussions and then settlements in many of those where there have not been published assessments, per se. The ones that have gone to trial have had various kinds of published assessments.

Q All of them? 3:59PM

A I can't say all of them, no. I just -- I can't recall, actually, how many of those may have had a separate assessment report versus the production of -- of various expert reports for part of the assessment.

Q How many of the natural resource damage 4:00PM

assessments have you worked on that had published restoration and compensation determination plans? 4:00PM

MS. COLLINS: Object to form.

A Well, the problem is that there are -- so many of these are ongoing and they have not reached that stage 4:00PM so, of -- of the restoration plan -- or they settled earlier in the process than -- than when that plan would have been developed, so, um, I can't answer that question, um. And it's also part of the -- part of the process that I typically don't work on that -- that end 4:01PM of it. I'm more involved in the injury -- the injury phases of the case. Like, I'm working on one particular confidential site right now where there is such a plan that it's been produced as part of the -- the claim, but I'm not free to discuss that. 4:01PM

Q It's not published?

A No.

Q Have you ever prepared comments on an assessment plan?

A Yes, I have. 4:02PM

Q Have any of those comments included a comment that trustees were not following the federal NRD regulations?

MS. COLLINS: Object to form.

A Yes, there may have been comments that there were 4:02PM

parts of the rule that may -- may not have been 4:02PM followed from my perspective.

Q How often is that a comment of yours?

MS. COLLINS: Object to form.

A I can only think of a relatively few cases where I 4:02PM might have prepared comments on an assessment plan. I only have one case in mind so it hasn't been very frequent.

Q So you can think of one case where you've done comment on an assessment plan, is that correct? 4:03PM

A I -- I can think of one that I can recall. I'm trying to check here to see if there -- there may be others where I might have commented. There -- I know that there's ones where our -- cases where our staff has provided comments, but I can't think of where I 4:04PM actually had input into that, other than I have provided comments on the -- as far as the Hudson River assessment plan.

Q And in those comments did you -- did you include a comment that the trustees were not following the federal regulations? 4:04PM

A I may have, I just don't recall.

Q What are the four phases of a natural resource damage assessment as defined by 43 CFR, Part 11?

MS. COLLINS: Object to form. 4:04PM

A Let's see, well, there would be the pre-assessment 4:05PM phase, the injury phase, the damages determination phase, and the -- and the restoration phase. But the injury phase is broken down into two subunits and I'm not sure how it's been broken down when you say four. 4:05PM

Q What's the difference between a Type A assessment and a Type B assessment?

A The Type A assessment is a very streamlined simplified approach. I have never been part of a Type A assessment. I think it's usually applied to 4:06PM relatively small oil spills or releases. And a Type B assessment is the more formal complex step of assessments required for at least for most of the, if not all, of the sites that I deal with where the rule is applied. 4:06PM

Q So is your experience with Type B procedures?

A Yes, it is.

Q Are there phases of a Type B procedure?

A Are there phases? Well, I talked about -- we just talked about phases, didn't we, about the 4:06PM pre-assessment phase and the pre-assessment screen and then the assessment phase and leading on through to damages and estimation of damages and determination of restoration requirements.

Q And those are the phases of a Type B procedure? 4:06PM

A Yes. 4:07PM
Q Is there a procedural order that is required to be followed for the various phases of doing an NRD under the regulations?
A Yes, there is. 4:07PM
Q Is it important to follow those procedural phases in order?
MS. COLLINS: Object to form.
A Well, is it important? The phases to me seem to be a series of logical steps starting with the 4:07PM pre-assessment screening, which basically evaluates the, you know, the appropriateness of a -- of proceeding ahead with the assessment to an injury determination, to then a quantification of those injuries, to a determination of service losses, and to 4:08PM a determination of either monetary damages or restoration requirements. To me, that seems to be a fairly logical series of steps to follow.
Q Do you believe it's a requirement of the NRDA regulations that that chronological system -- those 4:08PM phases should be conducted chronologically?
A I don't know that it's a requirement. As I indicated, it's my understanding at least that it's not required that -- that the trustees follow the rule at all, so I don't know that it would -- I don't have an 4:08PM

opinion on following the rule but not following the 4:09PM phases in the order that they're specified, I don't know.
Q Since you left PTI and started working at Exponent, I guess was that in 1997? 4:09PM
A That's correct.
Q And have you been employed there continuously ever since?
A Yes, I have.
Q Other than your work on natural resource damage 4:09PM assessments, what type of work have you done while at Exponent?
A Well, I have one major project that I've been working on is work in the San Diego Bay, the shipyard sites, which was a fairly large -- started with a 4:10PM fairly large ecological risk assessment and has since then moved into an extensive attempt at mediation of the case to resolve the issues for that site. That's been a major project of mine for the -- since 19 -- or since 2003. 4:10PM
Q Is that a Superfund site?
A No, it's not.
Q What are the contaminants of concern at that site?
A Contaminants of concern are mercury, arsenic, copper, zinc, lead, PCBs, PAH, tributyltin that's the 4:11PM

high priority COCs. 4:11PM
Q Is it a deferred site? Do you know what I mean by that?
A No, I don't.
Q Is your client an industrial client? 4:11PM
A Yes.
Q Is there an enforcement action ongoing by either the state or the federal government?
A I believe it would be called an enforcement action. The regional water quality control board in 4:12PM California has issued a cleanup and abatement order.
Q What is an ecological risk assessment?
A An ecological risk assessment is a fairly formalized process, although it can of many different forms, but it's been well described by EPA in a number 4:12PM of guidance documents but it's used widely in various regulatory programs and is a process whereby -- whereby the potential risks of -- of substances, and it could be hazardous substances or it can be other factors, other stressors, are evaluated as far as causal agents 4:13PM to adverse effects in -- in any group of biota.
Q Are you aware of whether any state or federal governmental entity has ever taken enforcement action against any company based on the results of an ecological risk assessment? 4:13PM

MS. COLLINS: Object to form. 4:13PM
A Well, yes, I am.
Q And have they, a state or a federal agency taken an enforcement action on the basis of an ecological risk assessment? 4:14PM
MS. COLLINS: Object to form.
A Well, in the current case that I was talking about, the shipyard matter in San Diego Bay, I managed the ecological risk assessment. And subsequent to that assessment, the agency issued a draft cleanup and 4:14PM abatement order in response to it so I think that is -- that's what you were asking, correct?
Q It is.
A Yeah.
Q Are you aware of any other instances where 4:14PM something like that has happened, an enforcement action being brought on the basis of an ecological risk assessment?
MS. COLLINS: Object to form.
A Well, I indicated earlier that I managed the RIFS, 4:14PM which a major part of the RIFS were a commencement day for the commencement of a Superfund site was an ecological risk assessment and -- and although I'm not aware of the details, I assume an enforcement action was taken. There has been a lot of cleanup activity 4:15PM

and settlement of the natural resource damage claims at that site so I think that would be -- that would be one.

Q In an ecological risk assessment, is risk of harm to a biological resource evaluated? 4:15PM

A Yes.

Q What is an ecotoxicologist?

A An ecotoxicologist is a scientist that has training and experience in the two disciplines of ecology and toxicology. Ecology being the study of the interrelationships among biological groups and the relation of those groups to the two environmental factors, and toxicology being related to the -- to the adverse effects of toxic substances to those organisms. It's a term that has been coined relatively recently, I would say in the last 15 to 20 years, perhaps, as a -- as a subdiscipline of those two primary disciplines.

Q Where did you get your education in toxicology?

A Oh, it was throughout my career. I was taking classes in -- relative to toxicology in -- at Oregon State University and -- and then specifically at New York University, too. So as part of both of those, actually all three of those programs.

Q Was the focus of your study on toxicology to aquatic biological species? 4:17PM

A I would say -- well, as far as some specific courses may have been more oriented towards aquatic toxicology, but I also have general training in toxicology and -- and experience in working with both terrestrial and aquatic species.

Q Does that include humans?

A I have been involved in -- in a number of human health risk assessments and managed human health risk assessments, but I am not a -- I'm not an expert in that area. I have had on my team in those cases human toxicologists that specialize in that area doing the actual work.

Q Have you had training in the toxicological effects of either phosphorus or nitrogen on biological resources? 4:19PM

MS. COLLINS: Object to form.

A Well, I've had classes, for example, in limnology, which is the study of fresh waters where -- in course work where that certainly was a subject matter being discussed. I don't know if -- if it would fit broadly under that category but -- but I've never had an actual course in toxicology of phosphorus, if that's what you're asking.

Q Is that an area of your expertise?

A Yeah, it's an area of my expertise as far as the

general responses of biological communities to stressors, whether they be hazardous substances or whether they be nonhazardous substances.

Q And specifically do you consider yourself to be an expert in the toxicological effects of phosphorus on biological organisms? 4:20PM

A Well, I think I am in the responses of biological organisms to phosphorus. Phosphorus, for example, being a growth stimulate, an essential nutrient to plants, that really doesn't fit into the kind of classical definitions of toxicological effects, of toxic effects. If there are adverse effects resulting from excess phosphorus, the kinds of effects that are usually observed we've talked about earlier, which could be, you know, high levels of eutrophication that may result in -- in overall adverse effects, but that adverse effect is the result of stimulation of certain organisms, rather than a toxic effect of that substance per se.

Q Can you define the word "toxic" for me? 4:21PM

A Toxic?

Q Yes?

A Is a substance that would cause an adverse effect, a measurable adverse effect in an organism would be a toxic substance.

Q A toxic substance is a substance which would cause a measurable adverse effect in an organism? 4:21PM

A That's correct.

Q And you agree that phosphorus can cause eutrophication? 4:22PM

A I do.

Q And that eutrophication can cause measurable adverse effects upon fish?

MS. COLLINS: Object to form.

Q Do you agree with that? 4:22PM

A That, as I indicated that, yeah, that the excessive growth of algae can cause conditions that would be detrimental to fish.

Q Can it result in fish mortality?

MS. COLLINS: Object to form. 4:22PM

A If there was sufficient eutrophication and sufficient adverse water quality resulting from that eutrophication, there is a potential that it could cause fish mortality.

Q Do I understand your opinion is that phosphorus is not a toxic substance? 4:23PM

A Well, my opinion is that speaking as a -- as a ecotoxicologist that phosphates, as they exist in the environment, do not fit the -- the definition of a toxic substance as causing a toxic effect. Phosphorous 4:23PM

as an elemental substance is a highly reactive, very dangerous substance that would fit my definition of a toxic substance. 4:23PM

Q And where does your definition of a toxic substance come from? 4:23PM

A That's based on my experience as a -- as an ecotoxicologist.

Q Is there a standard reference for the term?

MS. COLLINS: Object to form.

A There may be but I don't have one in mind right now. 4:23PM

Q We've been talking a lot about phosphorus and its role in eutrophication. When we've been talking about that, are we talking being elemental phosphorus or are we talking about phosphates? 4:24PM

A I've been talking about phosphates.

Q Does elemental phosphorus exist in the environment in its elemental form?

A Not naturally, no. It's very reactive and would be -- if it was released it would be -- it would quickly convert to other forms of phosphorus. 4:24PM

Q Could it convert to phosphates?

A Yes, it could.

Q Is the term "toxic" used in CERCLA?

MS. COLLINS: Object to form. 4:25PM

A I don't know. In CERCLA, I am used to hearing -- to having substances referred to as hazardous substances. 4:25PM

Q Is the term "hazardous substances" defined in CERCLA? 4:25PM

A I do know that there is a reference list of hazardous substances in CERCLA.

Q Do you know whether the term "hazardous" is defined by CERCLA?

A No, I don't. 4:25PM

Q Do you know whether it's defined by any of the regulations implementing CERCLA?

A I'm not aware of it, no.

Q Would you agree that phosphorus is listed as a hazardous substance under CERCLA? 4:26PM

A I believe that it is, yes.

Q Is arsenic a listed hazardous substance?

A Yes.

Q Is copper?

A Yes. 4:26PM

Q Is zinc?

A Yes.

Q Does the listing for arsenic include compounds of arsenic?

A I believe it does, that organoarsenicals are considered toxic forms or -- forms of arsenic under that consideration. 4:26PM

Q Are zinc compounds listed as hazardous substances under CERCLA?

A I can't answer that for zinc. 4:27PM

Q Are copper compounds listed as hazardous substances under CERCLA?

A I don't know.

Q Do you agree that the term "hazardous substance" as it's used in CERCLA has a legal meaning? 4:27PM

MS. COLLINS: Object to form.

A I don't know. I don't know. I think it has a regulatory meaning. I don't know that it has a legal meaning.

Q Are you aware of any instances where a court has held that phosphates in the form of orthophosphates is a hazardous substance? 4:28PM

MS. COLLINS: Object to form.

A I am vaguely aware of, I think, a decision in Texas where that -- where that was the ruling, yes. 4:28PM

Q Is that a case involving the Bosque River, do you know?

MS. COLLINS: Object to form.

A I don't recall.

Q Do you know the name of the case? 4:28PM

MS. COLLINS: Object to form. 4:28PM

A No, I don't. I think I saw a brief news release on it and that was it. I don't recall any of the details.

Q Are you aware of any other instances where a court has held that phosphorus in the form of orthophosphates is a hazardous substance? 4:29PM

A I have a vague recollection of seeing one other news item, but it's very vague and I don't recall even which state that may have been in, if I'm correct in my recollection. 4:29PM

Q Are you aware of any instances where a court has held that phosphorus in the form of orthophosphates is not a hazardous substance as that term is defined in CERCLA? 4:29PM

MS. COLLINS: Object to form.

A No, I'm not aware of that.

Q Do you know whether phosphorus in the form of orthophosphates that is released to water can present any risks to human health? 4:30PM

A I have to ask you for clarification on that. Do you mean a direct -- a direct result of that release and then exposure of humans to that phosphate and then suffering adverse health effects because of the phosphate itself? 4:30PM

Q I guess I mean something broader than that in the sense that if orthophosphate is released to water, can any risks to human health result from that release? 4:30PM

MS. COLLINS: Object to form.

A Well, as I indicated, I'm not a -- I'm not an expert on -- in the area of human health. I guess it is conceivable to me that -- that if there were sufficient phosphorus released to cause an excessive bloom of algae, that exposure to that algae or the water could potentially affect humans but I don't -- I don't know the details of that. 4:31PM

Q Are you aware of whether there are any cyanotoxins produced by bluegreen algae that could pose a risk to human health?

MS. COLLINS: Object to form. 4:31PM

A I'm just not aware of those toxins. As I indicated in prior testimony, I am aware of some evidence that those toxins could cause adverse effects in aquatic organisms, but I'm just not aware of the information that may be relevant to human health. 4:32PM

Q And I believe we discussed whether or not phosphorus leading to the production of total organic carbon could result in disinfection byproduct production in drinking water supplies earlier. Do you remember that? 4:32PM

A I don't recall. 4:32PM

MS. COLLINS: Object to form.

A I don't recall us discussing that subject.

Q Do you know anything about disinfection byproduct formation in treatment of eutrophic waters for drinking? 4:32PM

A No, that's not something I've studied.

Q Does phosphate contain elemental phosphorus?

A Well, the molecule does contain a phosphorus atom.

Q Not being a chemist, does it contain elemental phosphorus? 4:33PM

MS. COLLINS: Object to form. Asked and answered.

A Well, elemental phosphorous would refer to the -- the phosphorus in its purest state where it's not combined with anything. The phosphorus molecule contains the phosphorus atom and oxygen atoms -- the phosphate molecule that is, so I would term it as containing phosphorus atoms along with oxygen atoms. 4:33PM

Q What industrial clients have you consulted with on natural resource damages in Oklahoma? 4:34PM

MS. COLLINS: Object to form.

A That would be the -- the present case that we're discussing.

Q It states here that in these natural resource damage assessment projects -- and this is on Page 9-1 of your resume, that you have worked closely with legal counsel during strategy development and settlement negotiations with state, federal, and tribal trustees. How do you assist counsel with strategy development? 4:35PM

MS. COLLINS: Object to form.

A Typically I provide my scientific, my biological advice to them on the, um, the nature of the data that exists at the particular site under question. I provide my opinions on what the data mean. 4:36PM

Q And that's what you mean by strategy development?

A Well, in many cases I am asked -- I may be asked is this a situation -- do you think this is a situation where we should engage the trustees and discuss and, if so, what would you suggest as far as various issues that we might be able to discuss with the trustees and find common ground. And as I indicated before, I'm involved in a number of cases that are involved in settlement discussions and I'm frequently involved in -- in that whole process. 4:36PM

Q What is an "empirical relationship"?

MS. COLLINS: Object to form.

A An empirical relationship would be one that's based on data, on numbers, and I guess I would contrast that to a theoretical relationship. The empirical relationship would be based on measured characteristics of particular variables relating one to the other, and a theoretical relationship might be based on a model, on an assumed relationship between variables, let's say, and without direct measured numbers that go into deriving that relationship. 4:37PM

Q Also on 9-1, it indicates that you have developed site-specific sediment quality values based on empirical relationships of chemical concentrations and the biological effects. Do you -- when you develop these empirical relationships, did you employ any statistical analysis? 4:38PM

A That particular -- those relationships that I'm talking about there, yes, do involve statistical analyses. 4:38PM

Q Did you employ parametric statistical analysis for all of the analysis that you did?

A I believe that most of the analyses that were done in -- well, let me go back a minute here. The -- those kinds of empirical relationships that I was talking about, where was that again on here? 4:39PM

Q It's in the first paragraph, the very last line.

A Yeah, it refers to the development of what's called apparent effects thresholds for use as site specific sediment quality values in being able to -- 4:39PM

and the main use of those is to be able to predict the transition points between no effects and adverse effects of concentrations and sediments. The development of an apparent effects threshold involves a series of statistical comparisons with a -- either biological or toxicological sample. It could be a toxicity test or it could be a measurement of some form of community structure of a -- of a biological community. And it's a comparison between that sample at a particular site with concentrations of substances with an appropriate reference site sample. And so it is important in that overall determination of an apparent effects threshold to determine whether or not there is a statistical difference between an individual sample and its corresponding reference sample. I believe that in most cases where we have calculated apparent effects thresholds based on those statistical comparisons, that parametric statistics were employed but if it -- if it was determined that parametric statistics would not be appropriate in a particular application, then my usual procedure then is to apply a nonparametric test in lieu of the parametric test to evaluate that statistical difference. But I've been involved in the development of apparent effects thresholds for a number of areas and sites and I don't

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recall at all how many of those individual comparisons, because there would be hundreds and hundreds, that may have been parametric versus nonparametric.

Q In this context, when is it not appropriate for a parametric statistical test?

A Well, parametric test, and in the case of -- in the case of the two sample comparisons that I'm talking about here, there are certain assumptions regarding normality of the underlying data and probably more importantly on the -- on the differences in the variances of the two samples. And if those assumptions are not met, there's a potential to reach erroneous conclusions based on the results of a -- of a parametric statistical test because the test itself assumes certain things about the distribution of data. If those differences are substantial then and those underlying differences cannot be corrected by application of a transformation, then the alternatives are to run an approximation based on a parametric test or to just run the analogous nonparametric test that does not have those underlying assumptions and -- and evaluate the sample differences that way.

Q When you use the term "transformation," is the transformation of data the same thing as an effort to normalize the data?

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A That can be part of it, but when you look at parametric tests, usually those tests are relatively robust concerning deviations from the underlying normality assumptions. In other words, you can have non-normal data and it may not -- it may not affect to a great deal your conclusions that would be reached as far as the probability of a type-one error. However, those tests can be dramatically influenced by what are called heteroschedastic or nonhomogeneous variances. In other words, the variance is being dissimilar. If, for example, you have one sample with a very small variance and you're comparing it with a parametric test with another sample with a very large variance, and you run the parametric test, the test is not so robust as far as that difference and it can lead one astray in interpreting the results. So normally transformations are done more for correction of the variance components rather than the -- than the normality component.

Q Have you done many data transformations in conducting your statistical analysis?

A Well, I can recall cases where I have, yes.

Q Have you -- have you done a lot of statistical analysis in your career?

A Yes.

Q And it may be difficult for you to say, but have you regularly used data transformations in your statistical analysis?

MS. COLLINS: Object to form.

A I don't -- the term "regular." I have -- it is not for some situations and some data I have used transformations as well as I've used nonparametric tests.

Q When -- how do you decide between doing a data transformation and opting for a nonparametric test?

A Could you repeat that, please?

Q Yes. How do you decide between doing a data transformation and a parametric test and when you're going to opt for a nonparametric test?

MS. COLLINS: Object to form.

A Well, it, I guess, in part comes down to professional judgment and judgment on the degree to which a transformation may be potentially biasing your results just because of the -- of so highly transforming data because it's important to always keep in mind that when you run a test based on transformed data, that your hypothesis is no longer associated with the underlying data, it's associated with a transformation of the underlying data. For example, if a logarithmic transformation is used, then -- and you're comparing two samples, then your hypothesis that

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you're testing is associated with the log of the data rather than the data themselves. Whereas, if one runs a nonparametric test then you're still -- your hypothesis remains associated with -- with the actual raw data that were being evaluated rather than some transformation of those data. 4:49PM

Q Do you have a preference for -- for parametric versus nonparametric tests?

MS. COLLINS: Object to form.

Q Is one a more accurate method than the other? 4:49PM

MS. COLLINS: Object to form.

A Well, first, I wouldn't say one is more accurate than the other because they're both just -- they are what they are as far as tests and they tell you the probability of making a certain error in the analyses. I would say that unless the data really points otherwise, normally my preference would be to run parametric tests. 4:50PM

Q What is -- how do you define statistical significance for the purposes of conducting your statistical analysis? 4:50PM

MS. COLLINS: Object to form.

A Well, the term as I would use it and the term that's usually used as far as significance refers to the probability of making what's called a Type One error. In other words, Type One error is a -- could be termed a false positive. The conclusion -- the probability of concluding that there is a difference between two samples when a difference does not actually exist. 4:50PM 4:51PM

Q Is there a numeric value associated with that, that is applied when you do statistical analysis?

A The numeric value that ends up being associated with it is based on the results of the test which can be -- can be either expressed as a specific probability or the results of the test can be compared with a -- I guess what I would call somewhat standard significance levels and there can be an indication of whether one is -- is exceeding or not exceeding that particular level. 4:51PM 4:51PM 4:52PM

Q And what are standard significance levels?

A The two that -- that I see commonly used are .05 or 5 and .01, 1 percent.

Q Have you ever used .01 as a level of statistical significance? 4:52PM

MS. COLLINS: Object to form.

A Well, my procedure is normally to report the actual probability level resulting from the test, but I have certainly analyzed data where the probability level has been less than .01. 4:53PM

Q But have you ever used .01 as a standard significance level in conducting statistical analysis? 4:53PM

A Well, as I said before, I usually report the -- you know, rather than -- and just saying, for example, less than .01, I would give the actual level, whatever it is, .0001 or whatever is being less than that. I think where I have used -- where I have compared with more than these kind of what I call standard cutoffs, I would usually report it both ways, whether or not the probability was less than .05 and then whether it was less than .01. 4:53PM 4:53PM

Q Are there times when you have just used .01?

A I don't think so.

MS. BURCH: I think we might be done for today. 4:54PM

THE VIDEOGRAPHER: We are now off the record. The time is 4:54 p.m.

(Whereupon, the deposition was concluded at 4:54 p.m.)

SIGNATURE PAGE

I, Thomas C. Ginn, do hereby certify that the foregoing deposition was presented to me by Marlene Percefull as a true and correct transcript of the proceedings in the above-styled and numbered cause, and I now sign the same as true and correct.

Witness my hand this _____day of

_____, 2009.

_____

Thomas C. Ginn

SUBSCRIBED AND SWORN TO before me

this_____ day of _____, 2009.

_____

Notary Public

My Commission Expires:

C E R T I F I C A T E

STATE OF OKLAHOMA)
) ss.
COUNTY OF TULSA)

I, Marlene Percefull, Certified Shorthand Reporter within and for Tulsa County, State of Oklahoma, do hereby certify that the above-named witness was by me first duly sworn to testify the truth, the whole truth and nothing but the truth in the case aforesaid, and that I reported in stenograph his deposition; that my stenograph notes were thereafter transcribed and reduced to typewritten form under my supervision, as the same appears herein.

I further certify that the foregoing 173 pages contain a full, true, and correct transcript of the deposition taken at such time and place.

I further certify that I am not attorney for or relative to either of said parties, or otherwise interested in the event of said action.

WITNESS MY HAND AND SEAL this ____ day of April, 2009.

_____
Marlene Percefull, CSR
CSR No. 01818

April 22, 2009

Ms. Melissa Collins
Attorney at Law
1700 Lincoln Street
Suite 3200
Denver, CO 80203
Re: Depo of Thomas C. Ginn

Dear Ms. Collins:
Enclosed please find your copy of the above-referenced deposition. Also enclosed you will find the original signature page and correction sheet for the deposition. Please have Mr. Ginn review his deposition, make any corrections on the correction sheet and sign the original signature page in front of a Notary Public. As soon as this procedure has been completed, please return the original signature page and the correction sheet to me.

If you have any questions, please contact me.

Sincerely,

Marlene Percefull, CSR

CORRECTIONS TO THE DEPOSITION OF THOMAS C. GINN

PAGE AND LINE NUMBER CORRECTION

IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF OKLAHOMA

W. A. DREW EDMONDSON, in his capacity as ATTORNEY GENERAL OF THE STATE OF OKLAHOMA and OKLAHOMA SECRETARY OF THE ENVIRONMENT C. MILES TOLBERT, in his capacity as the TRUSTEE FOR NATURAL RESOURCES FOR THE STATE OF OKLAHOMA,	)
Plaintiff,	)
vs.	)No. 4:05-CV-00329-TCK-SAJ
TYSON FOODS, INC., et al,	)
Defendants.	)

- -

VOLUME II VIDEOTAPED DEPOSITION OF THOMAS C. GINN, produced as a witness on behalf of the State, in the above styled and numbered cause, taken on the 16th day of April 2009, in the City of Tulsa, County of Tulsa, State of Oklahoma, before me, Marlene Percefull, Certified Shorthand Reporter, duly certified under and by virtue of the laws of the State of Oklahoma.

A P P E A R A N C E S

FOR THE PLAINTIFF: Ms. Kelly Hunter Burch
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ALSO PRESENT: Opveon, Derek Anderson

I N D E X

(Whereupon, the deposition began at 9:09 a.m.)

THE VIDEOGRAPHER: We are on the record for Volume II deposition of Dr. Thomas Ginn. Today is April 16, 2009. The time is 9:09 a.m. Would counsel please identify themselves for the record? 9:09AM

MS. BURCH: Kelly Burch for the State of Oklahoma.

MS. COLLINS: Melissa Collins for the Cargill defendants and the witness. 9:09AM

MR. MIRKES: Craig Mirkes for Peterson Farms.

THOMAS GINN,

having first been duly sworn to testify the truth, the whole truth and nothing but the truth, testified as follows: 9:09AM

CONTINUED DIRECT EXAMINATION

BY MS. BURCH:

Q Would it be accurate to say that you're a limnologist?

A I don't describe myself primarily as a limnologist. I've certainly studied limnology, but I categorize myself generally as an ecotoxicologist, also an ecologist. 9:09AM

Q Does that include stream ecology, is that an area of your expertise? 9:09AM

A Yes, it is. 9:09AM

Q Are you an expert in chemistry?

A To the extent that chemistry is important in evaluation of toxicology, but I am not a chemist but I've had training and experience in chemistry as it relates to toxicology and ecology. 9:10AM

Q Have you ever conducted a fate and transport analysis using a water quality model?

A I'm trying recall. As far as fate and transport analyses, I've done those kinds of analyses using data, measured data on chemical concentrations. I cannot recall if I've been involved in a project that's actually used a model in evaluating fate and transport. I remember a project a number of years ago on the Poplar River in Montana where we used some modeling of both -- both water quality and atmospheric modeling and it involved long range transport in that river, but I would have limited experience in that. 9:10AM 9:11AM

Q Have you ever worked on a case involving pollution from an animal waste source? 9:11AM

A I don't believe so.

Q Have you ever done work on a watershed that had karst geology?

A Yes, I have.

Q Where was that? 9:12AM

A I've worked on a watershed in Missouri, two sites in Missouri, actually. One of them near Neosho, Missouri, a natural resource damage case; and another natural resource damage case near Joplin, Missouri. Both of these were karst geology. 9:12AM

Q What is it in terms of pollutant transport that's interesting about a watershed that's in a karst geology area?

A From a groundwater perspective, it's an important consideration because the -- because of the flow, the complexity of flow patterns in a karst geology are different, for example, than if it was a, let's say, a sand aquifer where there is a relatively -- there can be a relatively uniform flow. In a karst geology, there can be preferential flow pathways in other areas where there's very little flow, so it's a more complex situation as far as the hydrological flow patterns in a karst situation. 9:12AM 9:13AM 9:13AM

Q Is there anything else about the way water moves in a karst system that is important when you're looking at fate and transport? **9:14AM**

A I would not know all differences. I have a general understanding of the water flow patterns.

Q Is groundwater more vulnerable to pollution from surface activities in a karst geology watershed? **9:14AM**

A In many cases that I'm aware of, there is -- in a karst situation, there can be an interaction of groundwater and surface water through springs. Springs seem to be a fairly common factor in karst situations that I've worked on and so there's that -- I guess that potential interaction that may be greater in a karst geological situation than, let's say, a sand aquifer or deeper aquifer that's not karst. 9:14AM 9:15AM

Q Is groundwater more vulnerable to pollution from surface management of waste in a karst geology area than in a non-karst area? **9:15AM**

A I don't know if I could -- I can't answer that in a general form. I don't know.

Q Do you know whether pollutants which are in groundwater in a karst geology area are more rapidly transported than in a sand-type aquifer through the aquifer itself? **9:15AM**

MS. COLLINS: Object to form.

A That also is difficult to answer from a very general perspective, but I do know that there are -- in karst geology, one of the possibilities is that there could be, I think what I termed before, preferential transport pathways where there is a -- there may be a relatively rapid flow of water compared to the movement in a -- you know, in a more dense uniform aquifer. So 9:16AM 9:16AM

there is a potential in certain areas for a fairly rapid transport and then a very slow transport in other areas. 9:16AM

Q Did you evaluate fate and transport in the Illinois River Watershed? **9:17AM**

A No, I didn't.

Q Did you undertake to identify any particular sources of phosphorus in the Illinois River Watershed?

A No, that was not part of my -- my requested area of work. 9:17AM

Q So I take it you didn't undertake to quantify the sources of pollution in the Illinois River Watershed either, is that correct?

A No, I did not.

Q When were you retained in this case? **9:17AM**

A I was originally retained in September of 2005.

Q Who retained you?

A I was retained by Cargill.

Q Did you work at the direction of an attorney?

A Yes, I did. 9:18AM

Q Who was that?

A Well, the original direction would have been primarily through Cargill's counsel, Faegre law firm and it was Del Ehrich.

Q Did you work with any other attorneys? **9:18AM**

A At Faegre are you asking? 9:18AM

Q In this case.

A Well, I did have contact with Mark, and I don't recall his last name, but an attorney at Cargill. I have had contact with Linda Rockwood at Faegre, with Kristen Carney at Faegre, and, of course, Melissa Collins. 9:18AM

Q Is that everyone that you've worked with, all the attorneys you've worked with on this case?

A Well, let me see. I don't recall any other names at this time. 9:19AM

Q When you were retained, what were you asked specifically to do?

A The original request was to just evaluate the -- the information that was available for the Illinois River Watershed and to provide -- I would characterize it as general consulting advice to Cargill on -- on what -- what those data said, what they looked like, what was -- what kinds of data were available. It was a very general request. 9:19AM 9:20AM

Q When you say "evaluating the information available," what do you mean by that? How did you identify -- is it all of the information on the Illinois River Watershed that exists or is it a subset?

A My -- the request to me from the beginning of my 9:20AM

retention was to focus on the biological data that was available.

Q What did you do to gather up the biological data for the Illinois River Watershed?

A We did some searches through -- library searches, online reviews, literature reviews, trying to track down what might be available. 9:20AM

Q Did you contact -- did you gather up any information from the Oklahoma Water Resources Board?

A I don't remember. We may have had some contact, when I say "we," the team I was working with, with some state agencies but I'm not sure at this point whether we actually contacted any state agencies to obtain data. 9:21AM

Q Has all of the data that you gathered up as part of this evaluation been produced as part of your considered materials?

A I don't know. The data that -- as far as I know, the data that were in our files were turned over to counsel and I'm not absolutely sure that all of that was produced. I just don't know. 9:22AM

MS. COLLINS: Let me just state on the record that all materials that Dr. Ginn provided to us that had any relationship to the facts or opinions in his expert report have been disclosed. 9:22AM

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MS. BURCH: Okay. I'm specifically asking about any information he gathered. Has that all been produced? 9:22AM

MS. COLLINS: Yes, yes.

MS. BURCH: All of the fish and biological information he gathered as part of his initial retention -- 9:22AM

MS. COLLINS: Yes.

MS. BURCH: -- he's been describing, that's all been produced. 9:22AM

MS. COLLINS: Yes, yes.

MS. BURCH: Okay.

MS. COLLINS: There was no independent data gathering, if that helps.

MS. BURCH: That helps. 9:22AM

Q So on the 14th, which is the day before your deposition, some additional materials were produced to us that were identified as your considered materials. Do you know what was in those considered materials?

A I briefly looked through those materials that were produced before my deposition. 9:23AM

Q Do you know why those weren't produced earlier?

A No, I don't.

Q What types of information was contained in those considered materials that were produced on the 14th? 9:23AM

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A As I recall, there were a series of e-mails that included transmissions of some attached files of data. And there were also some -- there were copies of -- of a presentation that I'd made to -- to the Cargill team concerning some of the information that I had collected. 9:23AM 9:24AM

Q Anything else?

A I don't -- I don't remember the specifics. I looked through it very briefly.

Q Do you know how it came to be that that material was identified as needing to be produced? 9:24AM

A No, I don't. I turned over information that was in my computer files and I don't know the process that might have occurred.

Q Did -- is any of the information that you described in the e-mails or otherwise related to the opinions that are contained in your expert report? 9:24AM

MS. COLLINS: Object to form.

A Well, there was a -- there was a large amount of information there. As I recall, a couple of binders, and although I can't think of any specific items that are directly related to my opinions, I don't think I would be prepared to say that none of it is related to my opinions. I would have to go through -- if you wanted to ask me about specific items, I could make a 9:25AM

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judgment, I think, on whether or not they were related. 9:25AM

MS. COLLINS: What do you mean by "related"?

Q Information that's, you know, related to his opinions. I don't know.

MS. COLLINS: Let me just state for the record that all documents that Dr. Ginn relied upon, considered for his actual opinions in his expert report in this case, were produced at the time of his report. The second set of documents relates to maybe some of the same biological subjects but it was in no way relied upon or supporting any opinions in his report. It relates to the early consulting work that he did for Cargill that happened generally on the biological systems in the IRW and many of those documents either are duplicative of and ended up in his report or are literature that is probably duplicative of what we've already produced and identified, but in the abundance of caution and as a courtesy, we wanted to be sure and reproduce everything that we feel was related collaboratively, factually to the subject of his reports even though it wasn't something he relied upon. 9:25AM 9:26AM 9:26AM 9:27AM

MS. BURCH: I guess -- I appreciate that and did -- I guess the question that I'm trying to determine is whether any of the information was considered by him in issuing his expert report? 9:27AM

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MS. COLLINS: Well, and considered, you know, has many different meanings and especially in this jurisdiction. None of the materials that were produced on the 14th will be considered or relied upon by him for any opinion he states in this case. Does that answer your question? He may have looked at this stuff at some point three or four years ago, but it is not something he is relying upon for the opinions in his report. 9:27AM

MS. BURCH: So all of the material in here, unless it's been otherwise produced, is material that he hasn't looked at for three or four years, is that what you're saying? 9:28AM

MS. COLLINS: Exactly.

MS. BURCH: Okay. Thank you. 9:28AM

Q So after your initial retention when you were asked to evaluate the available information and generally consult on the data, were you able to reach any initial conclusions about biological conditions in the Illinois River? 9:28AM

A I had some conclusions, yes.

Q What were those?

A Well, let's see. I think from looking at some of the available information at the time, I thought there were some -- some open issues associated with the 9:29AM

status of biological communities that there had not been a -- a really systematic survey and rigorous survey of, for example, fish and benthic macroinvertebrates throughout the watershed. There were some pieces of information. There was information on the presence of some communities, like, for example. Fresh water mussels that I was able to look at. There were some available data on -- on sediment toxicity test results that I looked at. There were also -- there was some data -- some data on sediment chemistry of metals that I looked at. I did review some available information on hormones to see if there were any site specific data but I don't recall finding any at that time so that was -- that appeared to be a data gap. I think that's -- that's mainly what I found. 9:29AM 9:30AM 9:30AM

Q Did you look at water quality parameters that have the potential to impact fish or macroinvertebrates?

A I was not -- as I indicated, my responsibilities, as far as our retention, were during this what I would call the consulting phase of our retention were associated with the biological data. There were other members of our team that were evaluating other aspects, such as water quality information. 9:31AM

Q At any time during your retention in this matter did you evaluate water quality data that has the potential to impact fish or macroinvertebrate populations in the Illinois River Watershed? 9:31AM

A I have -- I looked at some water quality data, but as I said, it was not part of my -- my focus both during the -- what I would call the consulting phase of my retention and -- and then that became more -- more focused when my retention changed to that of an expert witness. My request for my services was to evaluate the biological information specifically on benthic macroinvertebrates and fishes. 9:32AM 9:32AM

Q Were you only evaluating whether such information existed or were you asked to draw some conclusions? I'm talking about in the consulting stage here. Were you just evaluating whether such sufficient information existed to be able to evaluate or were you also asked to give an indication about whether or not the existing information indicated impacts to fish or macroinvertebrate communities? 9:33AM

A I think if -- if there was conclusive -- if I found conclusive evidence concerning impacts to -- to macroinvertebrates or fish that, that I -- I -- I would have expected that -- that that would have been part of my charge, to be able to evaluate that information. 9:33AM

Q I'm not sure I understand the answer. Were you asked to give an initial opinion on whether there were any impacts to fish or macroinvertebrates in the Illinois River Watershed based on the available data? 9:34AM 9:34AM

A I do not recall being specifically asked to give an initial opinion. Although I did summarize, I recall, identifying one report by EPA on the Arkansas part of the Illinois River. And I do recall presenting, for example, the information in that report and summarizing the findings of EPA in that regard. 9:34AM

Q Was that the EPA report that's referenced in your expert report? 9:35AM

A Yes, it is.

Q In terms of looking at potential impacts to fish or macroinvertebrate communities, what types of sources of impacts were at issue? 9:35AM

A The information I had at the time was -- was reading the complaint, which I recall it's been some time since I've looked at it, but had allegations about a number of kinds of effects, including -- including eutrophication, including the releases of certain metals, and including what are called endocrine disrupting substances or chemicals, EDCs and effects of hormones. 9:35AM

Q Did you look into any existing data, literature, research, or studies regarding eutrophication or any 9:36AM

other type of issue that you just identified which were identified in the complaint? 9:36AM

A I do recall looking into the issue of -- of hormones and their potential effects in aquatic environments and their potential sources, so that was one area that I looked into. I also evaluated the -- and I think -- I think I may have summarized it to Cargill that available information on -- on the potential effects of metals in aquatic systems. 9:36AM

Q And what about nutrients, what did you do to look at nutrients? 9:37AM

MS. COLLINS: Object to form.

A Well, I recall briefing -- briefing Cargill on the potential -- in a very general sense, the potential effects of nutrients but -- as far as biological systems go, but as I indicated, that was the -- looking at the nutrient dynamics in the system was not an area during, during the consulting phase of my retention that I personally was working on. It would have been other members of our team. 9:37AM 9:38AM

Q How do you evaluate impacts of -- of nutrients on fish and macroinvertebrates without looking at nutrients?

A Well, it can be done by evaluating the communities that are present and evaluating whether or not those 9:38AM

communities appear to be responding to nutrients or not. And looking at the composition of those communities and whether or not that species composition and using the -- the presence of indicator species and using indices and evaluating whether or not the communities are responding because the response of biological communities to nutrients as well as many other substances is an integrative process. In other words, it's -- they're not necessarily responding to a -- a single point in time and as far as the nutrient concentration at that point in time, but they are integrating any potential effects of nutrients or other substances over time and so you can look at those communities to see if there's evidence of any adverse effects. 9:38AM 9:39AM 9:39AM

Q So it's your opinion that you can evaluate effects on fish and macroinvertebrates without understanding anything about nutrient concentrations or algae production in the watershed?

MS. COLLINS: Object to form. 9:40AM

A No, I'm not saying that. I'm not saying that at all, but I think that looking at -- trying to infer any potential effects by -- on benthic macroinvertebrates or fishes based on nutrient concentrations alone is a very uncertain process. And to me it -- it makes much more sense to look at those communities themselves to see whether or not they appear to be responding to nutrients, how they compare to -- to reference conditions, for example, and make conclusions based on the biological characteristics rather than predicting what might occur based on chemical concentrations. 9:40AM 9:41AM

Q Are phosphorus concentrations an important part of that analysis?

A Well, phosphorus concentrations are important if there -- if one is evaluating the potential causal relationships in evaluating whether or not phosphorus concentrations appear to be causing a particular effect. That integration could be important there. 9:41AM

Q And what do you know about phosphorus concentrations in the Illinois River Watershed? 9:42AM

A I have -- I'm aware of some of the phosphorus concentration data but it's been a long time since I've looked at it. I know that there are, I guess, compared to very undeveloped systems, I would call them, more pristine systems, there are some areas of elevated phosphorus levels in the Illinois River. 9:42AM

Q Do you know anything else about phosphorus concentrations in the Illinois River Watershed?

A Well, I don't -- as I sit here today, I don't have all the data in mind and the concentrations in mind. 9:42AM

As I said, that was not a -- a primary focus of my evaluation. 9:42AM

Q It wasn't a primary focus, but was it a focus at all? Did you evaluate the phosphorus data relationship to benthic macroinvertebrates or fish in the Illinois River Watershed? 9:43AM

A No, I did not.

Q Did you evaluate any data on any other water quality parameters that may impact fish or macroinvertebrates in the Illinois River Watershed in relation to the biological data on fish and macroinvertebrates? 9:43AM

A I do recall looking at the available data on sediment concentrations of metals. And then I looked at, I believe it was, some of the State's data on hormone concentrations that had been measured and I've -- I think that was the -- those were the chemistry data types that I looked at. 9:43AM

Q Can dissolved oxygen levels affect macroinvertebrates, benthic macroinvertebrates and fish? 9:44AM

A Yes, they can.

Q Did you evaluate the dissolved oxygen information available in the Illinois River Watershed to determine whether or not DO levels were affecting 9:44AM

macroinvertebrates or fish? 9:44AM
A No, I didn't look at it from that perspective.
Q Do you know whether any of the streams or Lake Tenkiller are designated as impaired by total phosphorus? 9:44AM
A I don't -- I don't recall precisely the nature of any of the terminology "impaired," but I do recall that there are areas where phosphorus was sufficiently high to -- to warrant a designation as a potential problem.
Q Do you know whether there are areas within the Illinois River Watershed in Oklahoma that are violating water quality standards for phosphorus? 9:45AM
MS. COLLINS: Object to form.
A No, I don't.
Q Do you know whether any of the surface water in Oklahoma within the Illinois River Watershed exceed the total phosphorus criterion? 9:45AM
MS. COLLINS: Object to form.
A When you say "the total phosphorus criterion," as far as the state standard or are you referring to the Scenic River criterion? 9:46AM
Q What's the difference between those two?
A I don't know. As I indicated before, but I -- I'm not sure the differences or the applicability.
Q So do you know whether the total phosphorus water quality standard applicable to surface water in the Illinois River Watershed is exceeded at any location? 9:46AM
A No, I do not know.
Q Do you know whether dissolved oxygen water quality standards are exceeded in any location in the Illinois River Watershed? 9:46AM
A No, I don't.
Q Do you know whether any water quality standards are exceeded in the Illinois River Watershed?
A I have not evaluated any exceedances of water quality standards. 9:47AM
Q Earlier you indicated that in your initial consultation you had provided Cargill with some general information on impacts of nutrients on biological resources or potential impacts. Do you recall saying that? 9:47AM
A Yes.
Q What type of information did you provide Cargill?
A Some of it may have been -- may be part of a presentation that was produced that we were discussing earlier. I don't recall specifically if it's in that, in those produced materials or not, but I would have provided some general information on the kinds of changes that are typically seen in -- in biological communities if there is -- if there's eutrophication that is to the degree that it's causing adverse effects. 9:47AM 9:48AM
Q Is there eutrophication in the Illinois River Watershed?
A Well, based on my evaluation of the data in the watershed, I think there are -- there are areas of the overall watershed that are eutrophic and even though I haven't done a precise evaluation of some of the parameters we've talked about, I have seen evidence of eutrophication myself in parts of the watershed. 9:48AM 9:49AM
Q Where did you see evidence of eutrophication?
A I have seen evidence of what appeared to be significant alga growth in some parts of the -- and I'm talking about algae, in this case phytoplankton, in some parts of the drainage system in Arkansas where there were -- where it was very low gradiant and the water seemed to be, essentially, pooled up. In some of those parts I noticed a distinctive green coloration to the water and fairly high turbidity, which may have been associated with both phytoplankton production and increased sediment load in the river. I've seen evidence in what I would call the -- the riverine, the upper portions of Lake Tenkiller, that just based on my observation and -- and some of the data I recall seeing would be most likely classified as eutrophic in that area. 9:49AM 9:50AM
Q Are there any other areas that you recall that you've actually seen where you identified eutrophication?
A As I remember looking at parts of -- of either -- and I believe it may have been Osage Creek and one other creek in, in Arkansas I saw some areas there more near the -- the towns of -- of Springdale, I think it was, and I can't remember the name of the other town, where I saw some evidence of fairly abundant filamentous algae growing on some rocks in that area that indicated that there may be nutrient sources nearby. 9:50AM 9:51AM
Q Did you -- I noticed in your expert report you identified a number of streams in the Illinois River Watershed. Do you recall that part of your report, the list of streams? 9:51AM
A Yes, I do.
Q Were some of those streams located in Oklahoma?
A Yes, they were. 9:52AM
Q Did you go out and visit any of those streams?
A I visited the -- the drainage area on two occasions and I did visit a number of the streams that are listed in the report, not all of them.
Q Did you visit Flint Creek? 9:52AM

A Yes. 9:52AM
Q Did you see any evidence of eutrophication in Flint Creek?
A I don't recall. I don't recall.
Q Did you visit the Illinois River? 9:52AM
A The Illinois River I did.
Q We talked about the riverine portion of the Illinois River, did you visit upstream locations?
A Yes, I did.
Q Did you identify any eutrophication in the 9:53AM Illinois River?
A I didn't -- as I visited the sites, I didn't see -- just visually for where I visited, I didn't see any areas where there was obvious eutrophication, but that was based on my own observations. I saw areas 9:53AM where some areas where water transparency seemed to be reduced, but as I indicated before, it appeared to me that it -- I couldn't tell whether it was mainly a contribution of suspended sediments or possibly phytoplankton. So I didn't -- I can't say that I saw, 9:53AM with the exception of the riverine portions of Lake Tenkiller, any obvious evidence of eutrophic conditions.
Q What time of year were you visiting the Illinois River Watershed? 9:54AM

A The first visit would have been in September of 9:54AM 2005. It would have been in the late summer. And the second visit was May of 2006.
Q When did you observe the eutrophication in the riverine portion of Lake Tenkiller? 9:54AM
A I believe that would have been on the first trip I mentioned in September of 2005.
Q Do you recall any other locations during your site visit where you identified eutrophication?
A No, I don't. 9:55AM
Q Did you state earlier that you had also reviewed some literature that indicated eutrophication was an issue in the Illinois River Watershed?
A I don't know what you mean there.
Q Are there any other sources which you have 9:55AM reviewed, whether they be literature, research, government studies or reports, that indicate eutrophication is occurring in the Illinois River Watershed?
A Well, I do recall reading some -- reading reports 9:55AM and -- and I've seen references to -- to elevated phosphorous levels and some potential problems with eutrophication in the watershed. I recall reading some reports, although I don't remember the specifics, about nutrient sources in some of the sewage discharges in 9:56AM

the systems and potential elevated phosphorus levels 9:56AM and -- and eutrophic conditions.
Q Did you review any, any literature, reports, research, that indicate poultry waste application is contributing phosphorus to the Illinois River 9:56AM Watershed?
MS. COLLINS: Object to form.
A No, that has not been something that I've been requested to evaluate.
Q Did you see any reference in your literature 9:57AM review to that issue?
MS. COLLINS: Object to form.
A Well, in my literature review, I was not concerned with that. That -- I can tell you that is part of our team effort during the consulting phase of our 9:57AM retention, that there were other members of the team looking at those issues. So I'm aware of that there were -- there were issues associated with poultry litter and there were individuals evaluating those data. 9:57AM
Q What do you mean you are aware that there were issues?
MS. COLLINS: I'm going to direct you not to answer this line of questions because it relates to the work product of a consulting expert. It has not been 9:58AM

disclosed in this case and we have no obligation to do 9:58AM so.
MS. BURCH: But he is a testifying expert in the case and he has had access to that information.
MS. COLLINS: It in no way was considered and 9:58AM relied upon for any opinion in this case.
MS. BURCH: He issues opinions about poultry contribution.
MS. COLLINS: It is in no way related, relied upon, or considered by him in any opinion he's offered 9:58AM in this case.
MS. BURCH: Yeah, okay. Well, I think I -- well, I'll think about this. We may have to get the judge on the phone for this one.
MS. COLLINS: Okay. 9:58AM
Q In your literature review, did you see any information regarding poultry waste application contributions to the Illinois River Watershed?
A As I indicated, that was just not -- that was not the subject of my review or my collection of 9:59AM information.
Q I understand that you -- there's a presentation which has been produced now to us which may set forth the information provided Cargill on the potential impacts of nutrients. Can you describe what the 10:00AM

potential impacts of nutrients in a eutrophic system are on benthic macroinvertebrates and fish? 10:00AM

A Well, eutrophication can, if it's sufficiently high, can affect the -- the kinds and abundances of both macroinvertebrates and fish that inhabit an aquatic system. It can result in community shifts to organisms that are more tolerant of -- of low dissolved oxygen, for example, that are more tolerant of the -- the enrichment of organic matter in sediments when compared to an oligotrophic system, so it is -- it can be a species shift when the effect of eutrophication become pronounced severe, the community can shift to -- both macroinvertebrates and fishes can shift to one that is dominated by a few tolerant species with a central disappearance of intolerant species. 10:00AM 10:01AM 10:01AM

Q Anything else happen?

A Well, there could be secondary effects associated with changes in -- in food supply. There can be very primary effects associated with actual mortalities of fishes, for example, which can change the fisheries potential. At the extreme end, in what I would call more mildly eutrophic there can actually be a stimulation of growth in a biomass of certain communities, enhanced growth because of enhanced food supply without an actual change in species composition. 10:02AM 10:02AM

So it's a continuum ranging from -- ranging from what I would call moderate changes in productivity and growth at one end to adverse effects as significant as lethality at the other end. 10:03AM

Q When you say "it's a continuum," what do you mean by that? 10:03AM

A Well, I mean that there is not an absolute change but the -- if you were to look at a scale ranging from oligotrophic to hypereutrophic, that range that we talked about yesterday, and evaluate the biological responses along that, that range of eutrophication, that there's not an absolute line from a biological perspective where you can say that bulleted point there are no effects, above this point there are effects on organisms, but the actual effects that are -- that may be measured or observed in a system like that would show a gradual change over that entire range. 10:03AM 10:04AM

Q Thinking about Lake Tenkiller as a reservoir, did you indicate that you believed that Lake Tenkiller is a eutrophic reservoir? 10:04AM

A No, I didn't say that. I said that based on my observation in visiting Lake Tenkiller that there appeared to be evidence of eutrophication in the -- the upper end, the riverine portion. I did notice, based on just my visual observations and looking at water 10:05AM

transparency and water color, that there appeared to be a dramatic gradient as I moved down towards the dam from that riverine portion, the water transparency was much greater at the lower end of the reservoir than it was at the upper riverine portion of the reservoir. So to me, that's why I could not, just based on my observations, make that generalized statement about the overall eutrophic state of the reservoir. 10:05AM

Q Do you know what the eutrophic state of the reservoir is? 10:05AM

A I've seen -- I've seen classifications where at least -- at least parts of the reservoir are indicated to be eutrophic and I seem to recall other information, and I can't recall the specifics, where other parts of the reservoir may be classified as mesotrophic and so I don't know -- I don't have in mind any recollection of some overall classification of the reservoir. 10:06AM

Q Would you have in mind a classification of parts of the reservoir, the trophic status?

A Well, I seem to recall that -- that based on some information that I had seen that certainly I think the upper part was classified as eutrophic and the rest, I don't have a good recollection of. 10:06AM

Q When you say "upper part," what do you mean?

A I mean more the riverine par, the end of the reservoir closest to where the Illinois River enters the reservoir. 10:07AM 10:07AM

Q Do you know how far that riverine section that we are discussing extends into the reservoir?

A No, I don't. I mean, it would be based on the -- when the -- when that part of the reservoir starts to broaden out more and widen out into what someone might call the main reservoir, that would be the, I guess, the transition from what I would term the riverine portion of the reservoir that is a narrower channel and more river like, so to speak, even though it's part of the reservoir than the main body of the reservoir. 10:07AM 10:07AM

Q What source of data are you -- are you referencing?

A I can't -- as I said, I can't recall. It just -- I remember reading some information and I'm -- it's a fairly vague recollection at this point but I do recall seeing that. 10:08AM

Q Okay. Let's go ahead and take a break.

THE VIDEOGRAPHER: We are off the record, 10:08 a.m. 10:08AM

(Following a short recess, proceedings continued on the record.)

THE VIDEOGRAPHER: We are back on the record, 10:36 a.m. 10:36AM

Q When you were retained as a consulting expert in this matter, did you work as a part of a team of consulting experts? 10:36AM

A Yes, I did.

Q Was that -- were the members of that team employed by Exponent? 10:37AM

A Yes, they were.

Q Do you supervise any of the team members?

MS. COLLINS: Object to form.

A No, I do not. 10:37AM

Q Do they work with you in the Arizona office?

A No, they do not.

Q How was the team assembled?

MS. COLLINS: Object to form. Can you just explain what you mean by "team" because there are different interpretations of that? 10:37AM

Q Well, I asked him if he was a part of a team and he said yes so --

MS. COLLINS: Do you mean his team of people who helped him or generally, like his equals? You know what I'm saying? 10:38AM

MS. BURCH: Everything, the whole team.

MS. COLLINS: Okay.

Q Do you remember the question?

A No, I don't now. Please. 10:38AM

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Q Okay. How was the team assembled? 10:38AM

MS. COLLINS: Object to form.

A I think, as I recall, in 2005, when we started to understand some of the issues in the case, there were -- there were actually two what I call teams as part of those consulting efforts. There was a team associated more with the -- the transport fate source dynamics issues and that team was assembled with people that were addressing those kinds of issues. And then I had a team working with me that was biologists that were working with me on some of the biological issues that I have discussed. 10:38AM 10:39AM

Q Okay. Who was in charge of the fate -- transport fate source and dynamics part of the work?

MS. COLLINS: And I'm going to direct you not to answer that question because again it gets at the work of a consulting expert that is considered work product and privileged and not been disclosed and will not be disclosed in this case. 10:39AM

Q Are you refusing to answer? 10:40AM

A Well, I'm respecting the advice of counsel on that issue.

Q And not answering?

A And not answering, yes.

Q And who's in charge of the biologists? 10:40AM

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A I was in charge of the biologists. 10:40AM

Q Who was the initial point of contact for the retention of Exponent in this matter?

A I was contacted initially, but I believe there was another individual contacted, too, on this matter. 10:40AM

Q Were you the first point of contact?

A I think the contacts were almost simultaneous.

Q And the other individual who was contacted initially in this matter, is that the same person that did the transport fate source and dynamics analysis? 10:41AM

MS. COLLINS: Again, I'm going to direct you not to answer that because it relates to the work of a consulting expert that's privileged.

A Upon advice of counsel I will not answer that.

Q Did you ever coordinate your work in this case with the individual who was responsible for the transport fate source and dynamics part of the analysis? 10:41AM

MS. COLLINS: Object to form. Misstates testimony. 10:41AM

Q I'm just asking did you ever coordinate?

A I -- even though we were doing separate work elements, we did conduct joint presentations and meetings with the clients, so to the extent that that involves coordination, yes, we did. 10:42AM

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Q Other than joint meetings, what other work did you do with the team responsible for transport fate source and dynamics? 10:42AM

A I was aware of what they were doing, although I was not participating in those analyses and any determinations or any activities they were doing, I was aware in a general sense of what they were doing, so to the extent that that would be coordination, then, yes, we were. 10:42AM

Q How were you aware of what they were doing? 10:42AM

A I was the overall project manager at the time for the project, so even though I had a clearly defined area of responsibility and we were essentially working as independent consulting experts with our teams, just by the nature of being the project manager, I was aware of the activities that were ongoing. 10:43AM

Q Did you have any participation in the selection of the team members for the transport fate source and dynamics part?

A Yes. 10:43AM

Q And what was your -- what were your responsibilities in that regard?

A It was only voicing my approval for the team members that were -- the personnel that were a part of that team upon the suggestion of the team leader. 10:44AM

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Q Were you involved in any way in either identifying or approving the work that the team was responsible for carrying out?

MS. COLLINS: Object to form. Vague.

A Yeah, in any way. I don't recall being involved in any approval or any of those activities. I -- although when you say "in any way," it's hard for me to answer, but I can tell you that the work that that particular team was doing, the discussions were between that team leader and the client as far as the work that they were doing and it was not under my purview to, to approve it. 10:45AM

Q Stepping back and being more general, you're the project manager, is that correct?

A Yes. 10:45AM

Q Did you have any responsibility for managing that project?

MS. COLLINS: Object to form. Vague.

A For managing it, yes. For -- I had responsibility to see that we were on time, within budget, that we had appropriate personnel assigned to the project and that was pretty much the extent of my management responsibilities. 10:46AM

Q Did you have any idea what they were working on?

A Yes, I did. 10:46AM

Q Were there reports to you, status reports to you on what they were doing? 10:46AM

MS. COLLINS: Object to form.

A Yes, there were.

Q Did you receive any preliminary results from their analysis? 10:46AM

MS. COLLINS: Object to form. Can you be more specific about "receive"?

MS. BURCH: I don't think so.

Q Do you understand the question? 10:47AM

A Well, I'll do my best. I was aware of -- of preliminary results that they had developed based on, on meetings and presentation of some of those results.

Q Was there a scope of work for the project?

MS. COLLINS: Object to form. If you're asking for a scope of work as to the -- the part of the project that was not related to the biological aspects that Dr. Ginn was responsible for, then you are seeking privileged information. And to that extent, I'd direct the witness not to answer. 10:47AM 10:48AM

A Could you repeat that statement, please? I'm talking about the most recent statement.

(Whereupon, the court reporter read back the previous statement.)

MS. COLLINS: I think she asked about the scope of work was the question. 10:48AM 10:49AM

A I did. I'm getting confused here, but I was requesting --

MS. COLLINS: You requested my --

A -- what you had said. 10:49AM

MS. COLLINS: Okay.

A I cannot recall if we had a scope of work or not. I just -- I just do not remember that specifically.

Q Were you involved at all in developing the scope of the work that the transport fate source and dynamics team conducted? 10:49AM

MS. COLLINS: Object to form.

A I don't recall being -- if there was a scope developed. And as I -- as I stated, I don't -- I cannot recall a scope of work. And if there was one, it was -- it would have been the product of that team, although if there was one, I would have been involved, most likely, in -- in reviewing it and assembling an overall scope with my activities involved. 10:50AM

Q And really what I'm trying to understand with this question in particular is without understanding what the team, what work they were going to do, how would you be involved in selection of the team members? 10:50AM

MS. COLLINS: Object to form.

A As I indicated before, only by approving a recommendation as part of -- on the part of the team leader for possible members of that team. 10:51AM

Q And you had no idea what work they would be performing, is that correct?

MS. COLLINS: Object to form, misstates testimony. 10:51AM

A No. I -- that's not true. I knew the general issues that they would be dealing with so I knew what kinds of -- of specific expertise might be needed in that area. 10:51AM

Q Are you willing to answer questions about the analysis of the transport fate source and dynamic team's work?

MS. COLLINS: Same objection. I direct the witness not to answer any questions in that subject area or any other subject of the work of a consulting expert beyond the subjects that are stated as Dr. Ginn's opinions in the expert report that was disclosed in this case. 10:52AM

A Based on advice of counsel then I would not be willing to respond to those questions. 10:52AM

Q Did you do work with any other consulting experts in this case?

MS. COLLINS: Again, I direct you not to answer any questions related to the work of consulting 10:53AM

experts, any consulting experts in this case on the grounds that it is privileged.
A Upon advice of counsel, I will not answer that question.
Q How were you able, in preparing your expert report in this case, to segregate out what you learned from the work of the other consulting experts in this case from what you knew in preparing your expert report? 10:53AM
MS. COLLINS: Object to form.
A Well, my retention as an expert consultant, testifying expert, was based on a defined set of -- of goals and a defined piece of work in looking at the biological communities, specifically benthic macroinvertebrates and fishes and so I -- that's what I dealt with. I did not -- I restricted my evaluations and the development of my expert report to those -- those issues and I did not consider any of those other -- any of those other issues and analyses that you mentioned. 10:53AM 10:54AM
Q Do you offer any opinions in your report about the impacts of poultry litter application in the watershed? 10:54AM
MS. COLLINS: Object to form.
A In my report, I do discuss some analyses I did as far as the -- the density of upstream poultry houses and the relationship to fish communities so to that 10:55AM

extent, I am -- I am doing some of those analyses. 10:55AM
Q Do you offer any opinions in your report regarding the impacts of urban influences on the Illinois River Watershed?
MS. COLLINS: Object to form, vague. 10:55AM
A I do, in that I do have some analyses of the relationships of -- of the percent of urban land use in subbasins and whether or not there are correlations with biological communities.
Q And is it -- is it your testimony that, that those potential sources, urban and poultry, were not in any way dealt with by the consulting experts? 10:55AM
MS. COLLINS: Hold on. Object to form and I'm directing the witness not to answer because again you are asking him questions about the subject matter of the work product of consulting experts in this case. 10:56AM
A Upon advice of counsel, I will not answer that question.
Q I'm going to hand you what I'm going to mark as Exhibit 2 to your deposition. Have you ever seen this document before? 10:56AM
A Yes, I have.
Q When did you see it?
A I saw this document just before -- during our last break and before I came in here. 10:57AM

Q So you hadn't seen it before today? 10:57AM
A I think I saw it very briefly two days ago, but I have not had the opportunity to study it or evaluate its contents.
Q You see at the top of it that it is labeled as a consulting expert redaction log? 10:57AM
A Yes, I do.
Q Are you a consulting expert in this case?
MS. COLLINS: Object to form.
A I was during -- during a certain period of my retention. 10:58AM
Q When did you no longer -- when did you become a testifying expert in the case?
A That transition occurred, as I recall, at the time of the release of the state's expert reports. 10:58AM
Q Do you recall when that was?
A That would have been, I think, about May of 2008.
Q I believe earlier when we were discussing the subject matter contained within the production that occurred on April 14th of this year, the day before your deposition, and actually the production occurred -- I received it on the morning of the 15th at 7:30 in the morning, but do you know which documents I'm talking about? 10:59AM
A Yes, I do. 10:59AM

Q Okay. Do you understand that this redaction log that is attached, I mean, that is labeled as Exhibit No. 2 is a redaction log for that production? 10:59AM
A Yes, that's my understanding.
Q Is it your belief that all of the material produced on April 15th was material which you had not considered in any way for three or four years? 10:59AM
MS. COLLINS: Object to form. It was produced on the 14th, but go ahead and answer the question. 11:00AM
A I can't say that it was information I had not considered. I may have considered it. It was not information, based on my fairly quick review of it, that I was relying on for the preparation of my expert report. 11:00AM
Q Would you turn to Page 2 of the redaction log? Would you look at the line that starts Ginn 007038?
A Yes.
Q Who is Kristen Shults Carney?
A She was formerly an attorney working with the Faegre law firm. 11:00AM
Q It appears that she is an author of an e-mail to you, is that correct?
A Yes.
Q And that was in June of 2007? 11:01AM

A Yes. 11:01AM
Q The title of that e-mail appears to be the 2005 BUMPs report, is that correct?
A Yes, it is.
Q Does it look like there is an attachment? 11:01AM
A It does appear that way.
Q Does the attachment appear to be 2005 BUMP data?
A That's correct.
Q Did you consider the BUMP data in your expert report? 11:01AM
A I considered the BUMPs report. The actual data I don't have a recollection of what that -- what that particular data is.
Q Would you look at Ginn 007053?
A Yes. 11:02AM
Q Do you see that that was an e-mail sent to you from Sheryl Law?
A Yes.
Q Who is Sheryl Law?
A Sheryl Law is a -- the scientist that works for 11:02AM Exponent at the Belview, Washington, office.
Q The scientist?
A A scientist.
Q A scientist?
A Yes. 11:02AM

Q Did she work as part of your team? 11:02AM
A Yes, she did.
Q Is she an attorney?
A No, she's not.
Q What are her responsibilities? 11:02AM
MS. COLLINS: Object to form. Vague.
Q If it helps, what are her responsibilities in this case?
A In this case, okay.
MS. COLLINS: Now, again, I'm going to direct 11:03AM the witness not to answer to the extent that -- of any information that relates to work, other than that that you are responsible for as either the opinions that are ultimately disclosed in your expert report or as your role as a project manager as you described earlier in 11:03AM approving the general allocation of team members for other consulting experts.
A Ms. Law pretty much throughout this project has provided support to me in reviewing information and collecting information for me on various aspects of, 11:04AM of -- of my activities and has been a -- more of a general support environmental scientist in those areas.
Q Did she do any data analysis for you?
MS. COLLINS: Object to form.
A She may have done some data compilations but she 11:04AM

did not do statistical analyses, as I recall. 11:04AM
Q The subject, the title of this e-mail is called a reference lake, is that correct?
A Yes, it is.
Q And it looks like there's an attachment to that 11:05AM e-mail that's called reservoir sampling SOP, is that correct?
A That's correct.
Q Did you look at reference lakes as part of your analysis and opinions in this case? 11:05AM
A Only to the extent of looking at the -- the reference lake that was used by the state in the comparisons with Lake Tenkiller.
Q Did you look at the state's reservoir sampling SOP? 11:05AM
A I -- I think I did look at it. I don't recall any specifics of that SOP today. But I -- it was sent to me by Ms. Law and I would assume I looked at the SOP.
Q Is the subject reference lake and reservoir sampling SOP not relevant to your opinions in this 11:06AM case?
MS. COLLINS: Object to form.
A No, I'm not saying that, I'm just saying that I don't recall the specifics of that SOP at this time.
Q Would you look at Ginn 7037? Do you see that? 11:06AM

A Yes, I do. 11:06AM
Q Is that another e-mail from Sheryl Law in 2007?
A Yes, it is.
Q And it's an e-mail to you?
A Yes, it is. 11:06AM
Q Do you see the title of that e-mail is called phytoplankton and BMI?
A Yes, I do.
Q Did you, in the course of your expert opinion in this case, render any opinion about either 11:06AM phytoplankton or BMI?
A I did not develop any opinions with regard to phytoplankton. BMI, I assume, stands for benthic macroinvertebrates and they were a part of my -- my work in this case. 11:07AM
Q Would you look at Ginn 7033. Do you see that one?
A Yes, I do.
Q Is that an e-mail in 2006 from Sheryl Law to you?
A Yes, it is.
Q And what is the title of that e-mail? 11:07AM
A Number of poultry houses and flocks.
Q Did you look at the number of poultry houses in the Illinois River Watershed as part of the preparation of your expert report?
A I did as I looked at the -- the density of poultry 11:07AM

houses and various subbasins of Illinois River Watershed.
Q Would you look at Ginn 007030, the top of that second page?
A Yes, I see it. 11:08AM
Q Is that an e-mail -- is that an e-mail in June of 2006 between -- from Kristen Carney to you?
A Yes, it is.
Q Does it appear to relate to a list of data collected by the State? 11:08AM
A Yes, it does.
Q Did you review any data collected by the State as part of issuing your expert report in this case?
MS. COLLINS: Object to form.
A Yes, I did. 11:09AM
Q Would you look at Ginn 007003, which is on the first page about four lines down?
A Yes, I see it is.
Q Who is Linda Ziccardi?
A Linda Ziccardi is a biologist in the Boulder, Colorado, office of Exponent. 11:09AM
Q And did she work as part of your team in this case?
A She did during the consulting phase of my retention. 11:09AM

Q And what did she do as part of that team? 11:09AM
A She was assisting me in collecting available information in various activities, but just working as a -- as a team member on assembling and presenting biological information. 11:10AM
Q What do you mean by "presenting biological information"?
A Developing summaries or presentations based on what information we were able to find.
Q Did Linda Ziccardi prepare the PowerPoint which is attached to this particular e-mail called Eco Cargill? 11:10AM
A She worked with me in the preparation of that presentation.
Q Is she an attorney?
A No, she's not. 11:10AM
Q Is the PowerPoint presentation Eco Cargill.ppt the presentation that you have produced to this date in this matter?
A I believe that is the presentation that I saw as far as the compilation of produced materials. 11:11AM
Q Who is Sonja Beamon, referenced on Ginn 007005?
A I don't know. I don't recall.
Q When the title of this e-mail is exhibits, do you know what those exhibits are?
A No, I don't. 11:11AM

Q Who is Brad Bessinger referenced on Ginn 007007? 11:12AM
A Mr. Bessinger was a former employee of Exponent in its Portland, Oregon, office.
Q Was he a part of your team?
A No, he was not. 11:12AM
Q Did he work on this case?
A Yes, he did.
Q What did he do?
MS. COLLINS: Again, I direct you not to answer to the extent the question calls for information related to the work of a consulting expert and unrelated to your opinions disclosed in your expert report in this case. 11:12AM
A Upon advice of counsel, I will not answer that question. 11:13AM
Q It looks like this e-mail was an e-mail to you on March 2nd, 2006, is that correct?
A That is correct.
Q And it was copied to Brooke Redding, is that correct? 11:13AM
A Yes.
Q Who is Brooke Redding?
A Brooke Redding was a former employee of Exponent at our Boulder, Colorado, office.
Q Did she do any work on this case? 11:13AM

A Yes, she did. 11:13AM
Q What did she do?
MS. COLLINS: Again, I direct you not to answer to the extent that the question calls for information related to the work of a consulting expert and not related to your work in the opinions that were disclosed in your expert report in this case. 11:13AM
A Based on advice of counsel, I will not answer that question.
Q The title of this e-mail is called Cargill, is that correct? 11:14AM
A Yes.
Q And there's an attachment called Tables.doc?
A That is correct.
Q Do you know what the subject matter of this e-mail was or what the -- what is in the Tables? 11:14AM
A No, I do not.
Q Would you look at Ginn 007015?
A Yes, I see it.
Q Is that an e-mail from Kristen Carney in 2006 to you? 11:14AM
A It is.
Q Is the subject matter of that e-mail the title of the e-mail Cargill/Status Report Deadline?
A Yes, it is. 11:15AM

Q Did you do regular status reports to Cargill in this matter? 11:15AM

MS. COLLINS: Object to form.

A Yes, yes, we did.

Q And when you did status reports, did you, as the project manager, do reports on both the biology work as well as the transport fate source and dynamics work? 11:15AM

MS. COLLINS: Object to form. I'm sorry. Can we read back the question?

(Whereupon, the court reporter read back the previous question.) 11:15AM

MS. COLLINS: I'll direct you in the same way to the extent that the question calls for information about work conducted by consulting experts, don't answer the question as privileged information. 11:16AM

A And could you repeat the question, please?

Q When you did status reports, and by "you," I mean you. Did you do reports to Cargill on the biology work as well as the transport fate and source and dynamics work. 11:17AM

MS. COLLINS: Object to form, vague.

A Well, upon advice of counsel, I don't think I can answer that question.

Q As the project manager, did you give status reports to Cargill on the entire project that Exponent 11:17AM

was doing for Cargill? 11:17AM

MS. COLLINS: Object to form.

A Yes, I did.

Q And did those reports include information on the status of the work for the transport fate source and dynamics portion of the analysis? 11:17AM

MS. COLLINS: Object to form.

A Yes, it did.

Q Did those reports contain substantive information about the project? 11:18AM

MS. COLLINS: Object to form. Which project?

MS. BURCH: The project he was responsible for managing.

A We're referring to the -- what I termed the consulting phase of our retention on this case. The reports that were submitted on a monthly basis, as I remember, with the invoices, contained a list of the -- the activities that had been conducted during the prior month. 11:18AM

Q And that would be all the work done by Exponent in the case? 11:18AM

MS. COLLINS: Object to form.

A I couldn't say that it's all the work. It was intended to be a highlight of the activities, but it certainly was not intended to describe all of the work. 11:19AM

Q Was it intended to describe part of the work of the transport fate source and dynamics team? 11:19AM

MS. COLLINS: Object to form. You can answer.

A It included the highlights of the work conducted by both teams working during the consulting phase of this project. 11:19AM

Q Did you produce all of the status reports that you prepared as part of your work in this case?

MS. COLLINS: Object to form. 11:19AM

A I don't know.

Q Did you provide them to counsel as part of your production to the State?

MS. COLLINS: Object to form.

A I don't know if they were provided to counsel or not. 11:19AM

Q Would you look at Ginn 007017? Is that an e-mail from Kristen Carney to you in 2006?

A Yes, it is.

Q The title of that e-mail, Data Collected by the State NRD Case? 11:20AM

A Yes, it is.

Q Do you know what this e-mail is in reference to?

A Not other than what its title says.

Q Did you consider any data collected by the State 11:21AM

as part of it's NRD case in issuing your opinions in this case? 11:21AM

A Yes, I did.

Q Would you look at Ginn 007022?

A Yes. 11:21AM

Q Is that an e-mail from Kristen Carney to you in 2006?

A It is.

Q And can you help me with the pronunciation of the person's name who is listed under copyees? 11:21AM

A I believe there's a misspelling there. As I recall, that person's name is Quynh Sperrazza, but that's my recollection of her name.

Q And who is Quynh Sperrazza?

A I think she was -- she was an employee of the Faegre law firm at the Minneapolis office. 11:21AM

Q Is the title of this e-mail Work Plans?

A Yes, it is.

Q What work plans did you produce in this case?

MS. COLLINS: Object to form. 11:22AM

A I don't recall work plans and I don't know specifically what -- what this e-mail is referring to.

Q Did counsel prepare any work plans to guide your work in this matter?

MS. COLLINS: Object to form. 11:22AM

A I don't recall that they did. 11:22AM
Q And did you prepare any work plans to guide your work in this matter?
MS. COLLINS: Object to form.
A I don't recall, as I sit here, the preparation of work plans. 11:22AM
Q Would you look at Ginn 007027, please?
A Yes.
Q Is that an e-mail from Rick Nelson to you in 2006?
A Yes, it is. 11:23AM
Q Who is Rick Nelson?
A Rick Nelson is an editor in our Boulder, Colorado, office, the Exponent Boulder, Colorado, office.
Q What does an editor do?
A An editor compiles and formats written documents and conducts a review to determine the -- whether the document meets our editorial standards as far as is it clear, is it -- does it present an appropriate flow of thoughts, that they provide advice back to authors concerning potential revisions to the document based on 11:23AM 11:24AM their editorial comments.
Q And did he do that type of work for you in this matter?
A Yes.
Q Did he do that type of work on your expert report? 11:24AM

what would we envision those studies looking like. And I think that that document is what's being referenced here. 11:26AM
Q Did you actually conduct the biological investigation, any biological investigation in the Illinois River Watershed? 11:26AM
A No, we did not.
Q Why not?
A I was not requested by the client to do any such investigation. 11:27AM
Q Was there a discussion about whether or not you should do the biological investigation described in the SAP?
MS. COLLINS: Object to form.
A I don't recall any discussion. I recall that we were requested to produce the document that I've described. It was not intended to be something that we were necessarily planning on doing. It was as I described. The client asked us if something were to be done, a sampling program, what do you think it would look like. We submitted it and submitted the document, and as I recall, there was no response to it -- to me. 11:27AM 11:27AM
Q Why would you do additional biological investigation in this watershed?
A At the time in 2005, 2006, my assessment was that there were significant data gaps as far as the available information on the Illinois River Watershed. At that time, I was not aware of the nature of the studies being conducted by the State. I don't recall being aware of them. And so I think that this document was mainly developed just then what kinds of studies might be done to fill those data gaps. 11:28AM 11:29AM

A No, he did not. 11:24AM
Q Did someone else?
A Yes.
Q And who is that?
A The work -- editorial work for me was done by Ms. Patti, P-A-T-T-I, Warden, W-A-R-D-E-N. 11:24AM
Q Did Patti Warden make any substantive changes to your expert report?
MS. COLLINS: Object to form.
A Not that I recall. They were relatively minor editorial comments. 11:24AM
Q Would you look at -- well, I have one more question about that particular e-mail, Ginn 007027. What is a biological investigation SAP?
A SAP is a sampling and analysis plan, which would be an attachment to -- typically to a description of a -- of a field or a laboratory effort that would provide a -- a description of what that -- what that sampling or that investigation would look like. 11:25AM
Q Did you, as part of your work in this case, prepare a biological investigation SAP? 11:26AM
A Yes. We were requested by the client to -- to provide a description if the studies were to be conducted in the Illinois River Watershed with regard to this case, what would -- how would we envision -- 11:26AM

Q What kinds of studies did you identify?
A It's been a long time since I've looked at that and I think that it -- if I could see it I could walk you through it, but I do -- I seem to recall it involved benthic macroinvertebrate studies. It may have involved sediment toxicity tests, and other aspects but I don't remember the details of it. 11:29AM 11:29AM
Q Did you set out any requirements for reference -- reference sampling locations? 11:30AM
A I don't remember.
Q Do you remember if you proposed any fish collection?
A I just -- I don't remember that, if fish were a part of it. 11:30AM
Q Why would you consider doing sediment toxicity sampling?
A Because based on my recollection of the complaint in this matter, there were allegations, I believe, 11:30AM

about potential releases of metals and some metals being of a high affinity for sediment particles and accumulates in the sediments. And so based on -- and based on a lack of available information and based on that potential issue in the case, I think I may have had sediment toxicity tests. As I said, I can't remember for sure but if sediment toxicity tests were part of that, that would have been the reason. 11:30AM 11:31AM

Q Okay. Would you look at Ginn 007029?

A Yes. 11:31AM

Q Is that an e-mail from Sheryl Law to you in 2006?

A It is.

Q And is the title of that document Peacheater Creek?

A Yes, it is. 11:31AM

Q Did you do any analysis pertaining to Peacheater Creek in your expert report?

A I believe there was -- there was one sampling station by the State and I don't recall whether it was fish or macroinvertebrates that was located on Peacheater Creek. 11:32AM

Q And did you analyze that as part of your preparation of your expert report in this case?

A Yes, I did.

MS. BURCH: This is a question for counsel. 11:32AM

It appears to me there are a number of e-mails on here which have been redacted which relate to his work that he did for his expert report. It also appears to me that there are some of the e-mails that relate to his -- to his work as the project manager at Exponent for their work in this case. I don't -- I don't think there's a valid basis to claim work product or attorney/client privilege on a number of these e-mails and I'd be willing to confer with you on it but, you know? 11:32AM 11:33AM

MS. COLLINS: Okay. This is not intended to reflect that we withheld these documents. In fact, all of these attachments and e-mails have been produced. There's just certain information on them that was redacted that is not related in any way to his expert report or opinions in this case. You know, I'm happy to go through those with you. And the reason that we determined to produce this now is because the subject matter is related, related to the opinions in his expert report. However, it is our position that none of the information produced in connection with this redaction log was considered by or relied upon by Dr. Ginn in forming his opinions as a testifying expert. This reflects early considerations by him as a consulting expert. 11:33AM 11:34AM

MS. BURCH: Would there be a point in conferring more on this? 11:34AM

MS. COLLINS: Absolutely.

MS. BURCH: Okay. Well, the problem is, obviously, we're in the middle of a deposition and you guys have produced this redaction log and the material on this to me on the day of, the first day of the deposition. And so, you know, I'm going to reserve the right to seek a ruling from the court on this and potentially examine the witness again, if necessary. The same -- the same issue with regard to not answering questions relating to his work as a project manager for Exponent work on this case, specifically related to any analysis done on fate and transport or source or dynamics. It seems to me that he oversaw those projects. I mean, he was the project manager and he did status reports on them. I believe that we're entitled to discover the substance of that work. I just -- there's no privilege attached to it. Is there any point on conferring on that further? 11:34AM 11:35AM 11:35AM

MS. COLLINS: Well, I think when you -- your use of the term project manager is perhaps different from what Dr. Ginn means as a project manager. He was the project manager in the sense that he was in charge of billing and a point of contact and the one responsible for, as he stated earlier, making sure that the -- that they were within budget and those aspects. He was not responsible as a manager of the work, the actual work product of any other consulting experts at Exponent. 11:35AM 11:36AM

MS. BURCH: And I think that -- I think that he was provided with the results of the analysis and was very -- he was the project manager. He oversaw the work of these people and did regular status reports to Cargill based on their work and I think we're entitled to discovery of that information. 11:36AM

MS. COLLINS: And I don't, so.

MS. BURCH: Okay. I will seek relief from the court on this --

MS. COLLINS: That's fine. 11:36AM

MS. BURCH: On this issue and reserve the right to come back and take additional deposition testimony on the subject matter on that as well.

MS. COLLINS: I very much understand that.

MS. BURCH: Let's go ahead and take a break. 11:36AM

THE VIDEOGRAPHER: We are off the record, 11:37 a.m.

(Following a short recess, proceedings continued on the record.)

THE VIDEOGRAPHER: We are back on the record, 11:51AM

11:51 a.m. 11:51AM

Q Would you identify for me all of the members of the team that you worked with in doing the biological analysis?

A And are you -- when you refer to that team, are you distinguishing between the phase as a consulting versus the phase of testifying expert? 11:51AM

Q I'm not.

A Okay. That team would be Linda Ziccardi, Z-I-C-C-A-R-D-I, that I think we've already discussed, with regard to the redaction log. Sheryl Law, L-A-W, who we've also discussed with regard to the redaction log. Randy O'Boyle, O apostrophe B-O-Y-L-E, Jane Ma, M-A, Melanie Edwards, Katy Palmquist, P-A-L-M-Q-U-I-S-T, Michael Kierski, K-I-E-R-S-K-I. 11:52AM Betty Dowd, D-O-W-D, Patti Warden, who we've already discussed, W-A-R-D-E-N. I'm thinking of another person and I'm -- I can't remember her last name.

Q Do you remember the first name?

A First name is Kristi, K-R-I-S-T-I. 11:54AM

Q Anyone else that you can recall?

A I can't remember anymore at this time.

Q Did any of the people that you've just identified do any work on anything other than the biological analysis? 11:54AM

A Yes. 11:54AM

Q And who is that?

A Gosh. I believe that Sheryl Law would fall under that category, Betty Dowd, Patti Warden most likely did, Melanie Ward. Would you be able to read the remaining ones back to me just so I can do a check? 11:55AM

Q Absolutely. Linda Ziccardi?

A I don't believe so.

Q Randy O'Boyle?

A Yes. 11:56AM

Q Jane Ma?

A Yes.

Q Michael Kierski?

A No.

Q Kristi? 11:56AM

A Yes.

MS. COLLINS: Is that Kristi Kaesler?

A I believe it is. I'm embarrassed that I can't remember her last name.

Q Do you believe it is Kristi Kaesler? 11:56AM

A Yes. K-A-E-S-L-E-R, I think.

Q What did Randy O'Boyle do in this matter?

A Randy O'Boyle is a GIS specialist and he is -- his work involves the development of geographic data bases and the production of maps based on that kind of information. 11:57AM

Q Was he involved in the production of the -- the maps, analysis of GIS information in preparation of your report?

A Yes, he was. 11:57AM

Q What did -- did he do anything else besides that?

MS. COLLINS: Object to form. Do you mean in relation to the report or generally?

Q Did he do anything besides the GIS work that you described? 11:57AM

A I don't believe so.

Q What did Jane Ma do?

A Jane Ma is also a GIS specialist that works for Randy and would have helped with preparation of maps.

Q What did Melanie Edwards do in this case? 11:57AM

MS. COLLINS: Object to form. Do you mean in regards to Dr. Ginn's report or generally?

Q Generally.

MS. COLLINS: To the extent the question calls for answers that relate to subjects other than your work as an expert in this case for Cargill and the opinions stated in your report, I direct you not to answer. 11:58AM

A Upon advice of counsel, I don't think I can answer that question. I can respond to what an individual did 11:58AM

as part of my team or teams, but not -- but I don't believe I can go beyond that. 11:58AM

Q Okay. Answer what you feel you can answer.

A Okay. We're talking about Melanie Edwards?

Q Mm-hmm. 11:58AM

A Melanie is a statistician and conducted statistical analyses of data.

Q Did she conduct any of the statistical analysis in your expert report?

A Yes, she did. 11:59AM

Q Did she conduct all of the statistical analysis in your report?

MS. COLLINS: Object to form.

A I believe that she did.

Q Did she do any other work that you can identify? 11:59AM

A I don't think under advice of counsel that I could identify anything else.

Q What did Katy Dalmquist (sic) do?

A That's Palmquist.

Q Ah. 11:59AM

A Katy is a benthic ecotoxicologist and worked with me in evaluating the benthic macroinvertebrate data for my report.

Q And when you say she worked with you, what specifically did she do? 12:00PM

A She assisted me in assembling information and in drafting report sections and in evaluating the interpretation of data.

Q Would that all be related to the BMI analysis that you did in your expert report? 12:00PM

A That's correct.

Q Was she involved in analyzing the spatial patterns of the BMI community characteristics?

A Yes, she was.

Q What did she do in that regard? 12:01PM

A Well, she all -- in all the topical matters under the benthic macroinvertebrate sections, she worked with me, as I said, in assembling information in -- in evaluating what that information meant and in the initial drafting of report sections. 12:01PM

Q Did she do the actual analysis of the data?

A The statistical analysis, most, if not all, of that was done by Melanie Edwards. Other compilations and analyses were most likely done by Ms. Palmquist.

Q Let's take, for example, the Shannon entities for Illinois River system BMI communities, did she calculate those? 12:02PM

A I believe she did, yes, although she would have been working closely with both Melanie Edwards and -- and Kristi Kaesler, a database manager in that work. 12:02PM

there's some -- there's some judgment on the part of the original author as far as the breakdown of categories of the indexes reflecting certain kinds of water quality. But the -- the tolerance values developed originally by Hilsenhoff and subsequently supplemented by other authors do represent a certain attempt at categorizing the tolerances of benthic macroinvertebrates to water quality changes. 12:04PM 12:05PM

Q To your knowledge, has it ever been applied to an Ozark stream system? 12:05PM

A I seem to have a vague recollection about -- about a publication there, but I can't -- I can't lay my hands on it right now.

Q Do you know whether there's a difference between Wisconsin streams and streams found in the Ozark region? 12:06PM

A Geographically, yeah, there is a difference, yes.

Q Is that the only difference that would be of importance to biological communities?

A Well, there's -- there's a fundamental difference in the -- in the nature of the streams as far as just the -- the underlying geology. There are -- there are differences in taxa present, although many taxa may be the same. There's, most likely, some different taxa present in -- in Ozark streams than in Wisconsin. 12:06PM 12:07PM

Q Did she calculate the -- the total abundance for BMI data in the Illinois River system? 12:03PM

A Yes. She was responsible for that task, but as I indicated on the other area for the diversity indices, she may very well have been assisted by other individuals. 12:03PM

Q Did she do the analysis of the Hilsenhoff Biotic Index?

A She was responsible for that task, yes.

Q Have you ever worked with the Hilsenhoff Biotic Index before? 12:03PM

A Yes, I have. I don't recall the exact cases that I have, but I have been familiar with it.

Q Do you know where it was developed?

A It was developed, as I recall, in Wisconsin. 12:04PM

Q Was it developed on Wisconsin streams?

A Yes, it was.

Q Have you -- are you aware of any research that indicates that a biotic index developed based on Wisconsin streams would be an appropriate index to apply to Ozark streams? 12:04PM

MS. COLLINS: Object to form.

A I think that the Hilsenhoff Index, as developed, there is some uncertainty as far as it's applicability to -- to many other areas and I think there's -- 12:04PM

Q Is that the only differences of importance to the biological communities? 12:07PM

A I'm not sure that's the only, but that's what occurs to me right now.

Q Where were these nutrient biotic indices that you employ on Page 5-17 of your report developed? 12:07PM

A I have -- I don't recall from that paper where they were developed.

Q Are you aware of any instance when those indices have been applied in Ozark stream systems? 12:07PM

A No, I'm not.

Q Did Katy Palmquist do the analysis of the nutrient biotic indices on Page 5-17?

A Yes, she did.

Q I think on Page 5-18 of your report you say sampling sites located within reference areas collected by the State are presumed to be minimally disturbed and provide a frame of reference for valuating community metrics to potentially impacted sites. What do you mean they were "presumed to be minimally disturbed"? 12:08PM

MS. COLLINS: Object to form.

A I think that I made that statement based on what I gained from reading. It may have been some of the State's expert reports or statements that I saw about the selection of reference areas that were intended to 12:09PM

represent those kinds of conditions. 12:09PM
Q Can you identify where you read statements like that?
A I can't recall at this point.
Q Why do you use the word "presumed"? 12:09PM
A Well, I guess I was using it as -- that was my presumption based on the information that I had read and what I had concluded about, for example, looking at Little Lee Creek and the development in that watershed.
Q Based on looking at Little Lee Creek, did you 12:10PM believe that the reference area was minimally disturbed?
A When compared to -- when compared to the Illinois River Watershed, yes.
Q Did you look at data on Little Lee Creek or visit 12:10PM Little Lee Creek to confirm that?
A I did not visit it, but I remember reading some information on Little Lee Creek at the time.
Q Do you recall what that information was?
A No, I don't. 12:10PM
Q Is there a reference for that in your report somewhere?
A I don't believe I cited anything.
Q What do you mean by "minimally disturbed"?
A I mean as far as both the -- the nature of the 12:10PM

habitat, the riparian areas, the documentation of known 12:11PM point sources of pollutants, the occurrence of urban areas that I think Little Lee Creek and all of those categories was significantly lower on a potentially affected scale than the Illinois River Watershed would 12:11PM be.
Q Did you have habitat data available for that site?
A No, not for the specific site. There may have been some limited habitat data collected in 2005 for one of the two sites on Little Lee Creek, but that 12:12PM would have been all that was available, I think.
Q Did you review that data to confirm that the sites that you're -- that you're comparing here were minimally disturbed habitat?
A No. I was speaking more -- I do recall looking at 12:12PM that data but I was speaking here more from a perspective of the watershed in general, rather than the -- that actual site or sites where reference data were collected.
Q Was there any sampling on Little Lee Creek in 2006 12:12PM or 2007?
A Yes, there was.
Q Did you evaluate any habitat data for those years?
A I don't recall ever being able the find habitat data for the sites on Little Lee Creek in 2006 and 12:13PM

2007. 12:13PM
Q Is it your belief that habitat characterization did not occur in 2006 and 2007?
A I don't know. All I know is that for the information that -- that I had, I could find no -- I 12:13PM could find no indication of habitat measurements conducted at those sites in 2006 and 2007.
Q Is habitat data important to the type of analysis that you conducted?
A It is. 12:13PM
Q Why is that?
A Because the organisms at any point are responding to -- to habitat variables and specifically benthic macroinvertebrates are sensitive to sediment particle size, to the organic content of sediments, to just the 12:14PM physical nature of the sediments, the degree of embeddedness. It's important they respond to the general stream characteristics, the degree of -- of bank erosion, let's say, the degree of riparian vegetation that is present, and fish in a similar 12:14PM manner so the habitat variables are very important.
Q How many reference areas did you have to compare sampling sites to?
MS. COLLINS: Object to form.
A In the 2006 and 2007 data sets, there were only 12:15PM

two, the two sites on Little Lee Creek. 12:15PM
Q And what about the 2005 data?
A 2005, I seem to recall that there were three reference sites sampled. One on Little Lee Creek, one on Spring Creek and one on Dry Creek, I believe. 12:15PM
Q Did you have an adequate number of reference areas for the analysis that you did to be comfortable with the comparisons?
MS. COLLINS: Object to form.
A Well, I -- and I think I, in the report, qualified 12:15PM this. I do not believe that the reference sites that were sampled on Little Lee Creek serve as a -- as rigorous and valid reference sites for all of the different sampling stations in the Illinois River Watershed, so that any interpretation of the data needs 12:16PM to take into account that that qualification -- that the reference site characterization was very limited relative to the diversity of habitats and streams that were sampled in the Illinois River Watershed itself.
Q And what's the importance of that to your 12:16PM analysis?
A The importance is that -- that the results of any analysis of those data have to be -- that has to be taken into consideration, that it is -- that you're looking at an approximation on a comparative basis of 12:17PM

one particular stream that I don't believe was an adequate reference stream for the entire data set, and so that any analyses need to consider that -- that those reference areas were very limited, especially limited in the -- in getting at the central question as far as the -- any potential effects of any releases of nutrients that could occur from poultry litter applications. To me, an appropriate reference area for the Illinois River Watershed to address that question would involve reference areas that were not only similar to the Illinois River Watershed stations in stream size, subbasin area, general hydrographic conditions, but that all other inputs of phosphorus and all other modifications to habitat should be the same as the assessment area stations, but for any releases of phosphorus as a result of poultry litter applications.

Q Where would you find a watershed like that?

A I don't know.

Q You would say an appropriate reference condition would be a watershed of the same size as the Illinois River?

A The -- not necessarily the same size as the whole watershed but the subbasin size, for example, when dealing with fish for a particular sampling point

should be approximately the same at a reference area as it is in the assessment area.

Q I see. And it should have the same pollutant sources except for the poultry?

A Yes, it should, because if you're going to factor out any incremental effect of any releases that might occur from poultry, it's important to be able to look at that differential and try as best possible to match the other factors.

Q And should those pollutant sources be contributing the same amount of pollution to the subbasin that you're evaluating?

A Well, not necessarily the same amounts, but the contributions as far as -- as concentrations that the organisms are seeing from those other sources should be approximately similar. That's the only way that you can factor out that incremental change.

Q Are you sure it's the only way you can do it?

A Well, from -- I meant only way with regard to the use of reference areas. I didn't mean to restrict it to the universe, apply it to the universe, but on our subject matter we're talking about on the use of reference areas, that is the way that I believe it should be done.

Q And do you believe that Dr. Stevenson established and used reference areas the same way that you used the reference areas?

A No, I don't think that he did.

Q How did he establish reference areas?

A As I recall, he -- he included, at least in some of his analyses, the reference areas that were sampled by the State into his data sets. He did not conduct any direct comparisons of conditions within the Illinois River Watershed and those reference areas.

Q When you're doing direct comparisons, how -- is that what you did in this case, direct comparisons?

A Yeah, and I did a qualified comparison because, as I indicated, I -- I did not mean to endorse those as valid reference areas. I think there are significant problems with using those stations as reference areas, but for comparative purposes, I looked at the communities that were found there versus the communities in the Illinois River Watershed.

Q And in doing direct comparisons to reference areas, how many reference site locations do you typically have?

MS. COLLINS: Object to form.

A That I really can't answer from a typical standpoint because it depends on a number of factors, including how variable the assessment habitat is, how

the sampling stations are selected in the assessment area, what the range of -- of hydrologic and water quality and/or biological conditions may be within that assessment area, and it's a matter of professional judgment then to select reference areas that would be representative of that range of areas. In some cases it would be matched to categories of, of -- in the case of rivers and streams of certain subunits that are being assessed. Typically my experience has been that for most situations involving relatively complex assessment areas, that there may be many reference areas required to develop this concept of -- I've heard it referred to as an envelope of conditions that would describe the variable conditions occurring in an assessment area.

Q To do a direct comparison in the Illinois River Watershed, do you have any opinion about how many reference sampling sites you would select, you would like to have?

A I did not develop that opinion, no.

Q Would it be more than two?

A It would be.

Q Do you think it would be closer to 20?

MS. COLLINS: Object to form.

A It would be closer 20 than two.

Q How variable is the habitat in the Illinois River Watershed that was sampled? 12:24PM

MS. COLLINS: Object to form.

A I think it's -- well, it's quite variable from just based on the -- the stream size itself, the sample area varied from relatively small essentially headwater streams to the main stem of the Illinois River. So in the characterization of stream order, probably streams in the first or second order streams up to fifth or six order streams probably. 12:25PM

Q And when we're talking about habitat in this context, was your answer limited to benthic macroinvertebrate habitat or were you speaking more broadly?

A I'm speaking more broadly. 12:25PM

Q And how variable is the benthic macroinvertebrate habitat in the Illinois River Watershed?

MS. COLLINS: Object to form.

A From my observations, it's quite variable. Benthic macroinvertebrates, as I indicated, are very 12:26PM sensitive to changes in -- in the nature of the substrate that they inhabit. And, for example, benthic macroinvertebrate communities that inhabit a relatively small gravel substrate, all other conditions being equal, may be quite different than benthic 12:26PM

macroinvertebrates that inhabit a larger cobble-type 12:26PM environment that may have considerable amounts of finer materials embedded in between it. And the organisms have very specific preferences and habitat requirements so they -- the communities would vary according to the 12:26PM nature of those substrate materials.

MS. COLLINS: I don't mean to interrupt your flow but we need to break at 12:30 because Dr. Ginn has a call and so do I.

MS. BURCH: Okay. I believe -- what time is 12:27PM it?

THE VIDEOGRAPHER: 12:27.

MS. BURCH: Okay. I am -- we need to do any conferring that we can do on the -- the redaction log. I would like to take the time to ask Magistrate Cleary 12:27PM to rule on these issues. I'm going to seek additional time to depose the witness --

MS. COLLINS: Okay.

MS. BURCH: -- as well. I'm spending substantial amounts of time trying to talk about things 12:27PM which I haven't seen yet in this deposition and would like to spend more time on this today, but I guess we'll take the time and do that when we get back from lunch if that's okay with you.

MS. COLLINS: I'm not sure I understand the 12:28PM gist of your request. 12:28PM

MS. BURCH: I would like to see if we can get a hearing before Magistrate Cleary when we get back from lunch on the issues of the redaction log.

MS. COLLINS: Okay. 12:28PM

MS. BURCH: And the production of the -- the consulting expert material and the refusal to answer questions related to his work.

MS. COLLINS: Okay.

MS. BURCH: So could I finish this line of 12:28PM questioning? I'm trying to go quickly. I have one more question, I think.

MS. COLLINS: Okay, sure.

MS. BURCH: But who knows, but I'll try to go fast. 12:28PM

Q Did you evaluate the habitat at any of the sampling sites, the benthic macroinvertebrate sites?

A No, I did not.

Q Do you know whether they differ?

A I've been to some of the sites and I have viewed 12:29PM many of the areas, certainly not all, in the watershed, and I have observed in just walking some of the streams and wading parts of the streams and digging around in the substrate a little bit some significant differences of -- of substrate habitat type and of riparian habitat 12:29PM

type throughout the system. 12:29PM

Q Was the sampling locations that you evaluated were those all done in riffle habitat?

A Yes, they were.

Q And did you do any evaluations that would document differences in riffle habitat in the Illinois River Watershed? 12:29PM

A Only my observations that even in riffle areas there can be significant differences in the nature of the substrate within that riffle habitat. 12:30PM

Q There can be. Did you document any differences?

A Only by my observations. I did not conduct measurements of those differences.

Q Do you have any notes of your field observations or any analysis of your field observations that we could look at? 12:30PM

A No, I do not.

Q Okay. Thank you. Go ahead and break.

THE VIDEOGRAPHER: We are off the record, 12:30 p.m. 12:30PM

(Whereupon, the following was heard not on videotape.)

THE CLERK: This is Case No. 05-CV-329-CKS-TJC, The State of Oklahoma versus Tyson Foods, et al. Counsel, please state your appearances. 1:32PM

MS. BURCH: Kelly Burch for the State of Oklahoma. 1:33PM

MR. TUCKER: This is John Tucker and Melissa Collins for the Cargill defendants.

MR. MIRKES: Craig Mirkes for Peterson Farms. 1:33PM

THE COURT: All right. Is that it?

MS. BURCH: Yes.

THE COURT: Okay. What is the issue or what's happening at this deposition that is creating a problem. 1:33PM

MS. BURCH: This is Kelly Burch.

THE COURT: Mm-hmm.

MS. BURCH: I'm here taking the deposition of one of the defendants' experts, Dr. Thomas Ginn, and this deposition convened on yesterday morning. The day 1:33PM prior to the deposition convening, I was notified by e-mail that there was some additional material that they were going to produce for Dr. Ginn and I received those materials the next morning around 7:30. With those materials was a redaction log for certain 1:34PM documents that were in the production. And upon examination today, I discovered that Dr. Ginn previously served as a consulting expert in this case for the Cargill defendants at Exponent, a consulting company, and that he was the project manager for the 1:34PM

consultation and, basically, that it was -- the 1:34PM consultation was separated into two distinct areas, one biological resources and the other, what he described as, fate transport source and dynamics analysis. He was the project manager for both of those exercises and 1:34PM did -- participated in the selection of the team numbers for the fate and transport portion, as well as provided status reports to the Cargill defendants on the work for both of those projects. Today during the deposition, he was directed not to answer questions 1:35PM related to the fate transport source and dynamics portion of the work, and also the materials related to that work, even though they are in -- have been in his possession and reviewed by him. And he's been at meetings where there have been presentations on that 1:35PM topic. Those materials have not been produced. That some subset of those materials related to the biological analysis were produced but even then we have a redaction log. I'm not sure of the basis for the redactions on those, although counsel acknowledged that 1:35PM the subject matter on the redaction logs is related to his actual expert report in this case. And so I guess I'm here seeking the opportunity to review the materials related to his project management at Exponent and to be able to question him about that subject 1:36PM

matter of that work that he did on the case, as well as 1:36PM be able to challenge a redaction log for a production related to an expert report that was produced by him in the case.

THE COURT: Okay. Who wants to respond? 1:36PM Mr. Tucker, is this your, your issue?

MR. TUCKER: Your Honor, I'd like to ask Ms. Collins to respond, if I might, as she is presenting the witness for the deposition and is in the best position to articulate our views. 1:36PM

THE COURT: Okay.

MS. COLLINS: Yes, Your Honor, this is Melissa Collins. Essentially by way of background --

THE COURT: Mm-hmm.

MS. COLLINS: -- Cargill had a consulting 1:37PM expert also as a firm called Exponent, which is where the witness today, Dr. Ginn, who is a testifying expert also worked. Dr. Ginn's role was essentially to be in charge of billing as a project manager. He did not in any way run or influence the project that is the 1:37PM subject of this separate consulting expert. We understood through your guidance in B.H. versus Goldfield's Mining and in J.B versus Ensarto (phonetic), that even though Dr. Ginn was a consulting expert prior to essentially May of 2008, that we still 1:37PM

had an obligation to produce any records in his 1:37PM materials that were factually related to facts or opinions in his ultimate report in this case. We have done that. However, because the consulting expert and Dr. Ginn worked in the same offices and because Dr. 1:38PM Ginn was responsible for billing, some of the materials of this other consulting expert were in his possession. They were not relied upon or considered by him in any way in forming his opinions in his expert report. Therefore, in order to protect the privilege of the 1:38PM work of a separate consulting expert, we generated a two-page redaction log that reflects that certain parts of e-mails and documents that were unrelated to Dr. Ginn's expert report have been redacted.

THE COURT: Mm-hmm. 1:38PM

MS. COLLINS: The parts that are related factually or otherwise to his opinions in his report have been produced. I have directed Dr. Ginn not to answer questions that are not related to the opinions he ultimately formed and disclosed in this case. 1:38PM

THE COURT: All right. And basis for not answering those questions is what?

MS. COLLINS: Because it would reveal the work products of a consulting expert.

THE COURT: Okay. 1:39PM

MS. COLLINS: And because it was not related to the facts or opinions in his expert report. 1:39PM

THE COURT: Okay.

MS. COLLINS: Nor considered by him in forming those opinions. 1:39PM

THE COURT: Okay. Well, it's going to be very difficult to assess this particular situation and argument in a phone call, I'm afraid. I think I'm going to have to see some briefing on this issue. I think maybe the safest course of action is to allow 1:39PM Dr. Ginn not to answer for purposes of this deposition until we get through a cycle of briefing on the questions you're posing here. And then if the Court decides that -- that he, in fact, needs to answer the questions then we're going to have to -- to provide Ms. 1:40PM Burch with an opportunity to come back and do that. On the other hand, if the Court finds that the materials involved are not subject to inquiry, then you'll, I guess, stand on the deposition as it concludes. I'm trying to figure out. When can you have some sort of a 1:40PM brief to me? And I suppose if there's a two-page redaction log, it might be just as easy to submit the documents for in camera review at the same time and let me take a look at them and get an idea on what -- what's here. Now, Dr. Ginn -- has Dr. Ginn been a 1:41PM

testifying expert all along? 1:41PM

MS. COLLINS: No. He was initially retained as a consulting expert and it wasn't until the time that the State disclosed their expert opinions in this case that -- that Cargill made the decision to retain 1:41PM him as a testifying expert and produce opinions in our report.

THE COURT: Okay. I mean, that does muddy the waters on, you know, what he saw and when he saw it and -- and I know I'm anticipating to some degree what 1:41PM the issue might be here. I've started looking at some cases on this and it just becomes clearer that some courts have held that once the witness switches hats from a consulting to a testifying expert, that may very well throw the door open, but before I make any 1:42PM determination on that, I'd like to -- I'd like to see your briefing on it and see what specifically we're talking about. This just isn't the sort of issue that I think can be handled in a phone call. So when -- Ms. Burch, when can you file a short brief outlining 1:42PM your position on the matter?

MS. BURCH: I would try to get it by Monday but would like to maybe have until Tuesday.

THE COURT: All right. Tuesday. And that -- that would be, what, the 21st, is that right? Yeah, 1:42PM

that would be the 21st. And Ms. Collins, when do you think you could respond to that and then provide -- I'm assuming that if the redaction log is only a couple pages, and maybe this is the wrong assumption, but what is the volume of material associated with that 1:43PM redaction log that the Court would have to look at? 1:42PM

MS. COLLINS: Well, the redaction log is two pages and they're essentially e-mails. Now, there are attachments to some of those e-mails. None of the attachments have been redacted and the attachments are 1:43PM generally literature and data and exhibits and pleading from this case. So if you included the entire collection, I understand that to be about 2,600 pages. However, the documents that have actually been redacted are e-mails themselves. 1:43PM

THE COURT: Mm-hmm.

MS. COLLINS: And that collection, you know, fits in two, three small three-ring binders, so I'm not sure how many pages it is.

THE COURT: On the attachments, do you know 1:43PM whether those attachments have been produced to the other side via some other pathway?

MS. COLLINS: They have also been produced in this collection and some of them are the State's own documents and also literature that has been previously 1:44PM

produced. 1:44PM

THE COURT: Okay. So the attachments, although they may be referred to in the e-mail, the attachments themselves in your view are not an issue in terms of -- of production because the other side 1:44PM already has all of that.

MS. COLLINS: No, no. To be clear, Your Honor, the State has not before had all of the attachments. And to be clear as well, some of the attachments may inform the state as to the e-mail that 1:44PM they are attached to it, so I wouldn't want to characterize it that way.

THE COURT: Okay.

MS. BURCH: Some of the attachments, Your Honor, we just received on the morning of the 1:44PM deposition yesterday.

THE COURT: Right.

MS. BURCH: And I'll raise this in the brief as well, I would like the opportunity, depending on what these documents are once I get a chance to really 1:45PM look at them, for you -- to potentially be able to examine him about them.

THE COURT: Right.

MS. BURCH: So that's sort of a related issue. 1:45PM

THE COURT: Right. I understand. And if you're getting expert papers the day of the deposition, that, I think does create a bit of a fairness issue in terms of having some time to prepare. All right. Well, why don't -- Ms. Burch, why don't you file your brief by Tuesday, the 21st, and then Ms. Collins, how much time do you want to respond to that? 1:45PM

MS. COLLINS: Well, I can do the same thing, within three days. I think that's essentially --

THE COURT: Okay. Do you think you can get it done by Friday of next week? That would be the 24th or do you want until the following Monday? 1:45PM

MS. COLLINS: Why don't we go with the following Monday, if you don't mind?

THE COURT: Okay. 1:46PM

MS. COLLINS: Will the issue of the State's request for additional time also be included in the subject of these briefs?

THE COURT: I think might as well. We might as well get it all out on the table and try to address it. I do think that it's awfully difficult to -- to -- depending on the nature of the materials, you know, but it does seem to me that it is going to raise an issue when somebody gets materials handed to them essentially the morning of the deposition to take the deposition 1:46PM

and review the documents at the same time. 1:46PM

MS. COLLINS: Sure.

THE COURT: Depending on what they are. If they're things that everybody was pretty much aware of then maybe it's no harm, no foul, but I still think that a party ought to be given some reasonable opportunity to look over new materials before having to lock itself in with a deposition. 1:46PM

MS. COLLINS: Sure. And just to be clear, Your Honor, the initial -- this was a supplemental production of materials. The larger volume of materials that support and were considered by Dr. Ginn in the forming of his opinions were produced earlier. 1:46PM

THE COURT: Okay. Okay. Well, why don't you go ahead and brief on that basis. Reserve these questions of Dr. Ginn. In other words, let him decline to answer at this point and then once the Court makes a ruling, you know, it may mean that Dr. Ginn has to make himself available for a follow-up deposition. Okay? 1:47PM

MS. BURCH: All right. Thank you, Your Honor. Can I confirm that the transcript will be ready in time for me to get the brief done on Tuesday before I finalize that date because I can't do it without the transcript? 1:47PM

THE COURT: On the questions you need. 1:48PM

MS. BURCH: Yes. She's sitting right here so. 1:48PM

THE COURT: Okay. Why don't you go ahead and see how long that's going to take?

(Whereupon, a discussion was held off the record.) 1:48PM

MS. BURCH: Well, the transcript won't be ready until Wednesday. I apologize, I should have checked that before I agreed to that time. So I hate to slow it down but could I have until the Monday after to do -- 1:48PM

THE COURT: You will be looking at the 27th I think that's right. Because we were originally going to give you the 21st, but now the transcript is not going to be ready until the 22nd, right? 1:48PM

MS. BURCH: That's right.

THE COURT: So if you would get the transcript on Wednesday and you would then have Thursday, Friday and file your brief on the 27th, the following -- that Monday? 1:49PM

MS. BURCH: Yes.

THE COURT: And then Ms. Collins, you were saying three or four days after that, so now we're talking about maybe -- the 27th is a Monday. Could you be ready by the 30th? 1:49PM

MS. COLLINS: Yes, Your Honor. 1:49PM

THE COURT: Okay. All right. So the 27th for Ms. Burch and the 30th for Ms. Collins. And we'll try to jump on these things quickly so that we can try and keep you on some sort of a schedule. 1:49PM

MS. COLLINS: Your Honor, do you want for in camera inspection, do you want us to show you or produce those documents under seal on April 30th along with the unredacted versions?

THE COURT: You might as well. Might as well. You know, I don't know how long it's going to take me to wade through all that stuff, but I might as well have it and maybe I can -- maybe I can peruse it quickly and see what we're talking about. But I'm afraid -- I'm afraid that without looking at the documents I'm going to be as much in the dark as I am right now. 1:49PM 1:50PM

MS. COLLINS: Okay.

THE COURT: All right.

MS. BURCH: Thank you very much, Your Honor. 1:50PM

THE COURT: Okay.

MS. COLLINS: Thank you.

THE COURT: Bye.

THE VIDEOGRAPHER: We are back on the record. The time is 1:59 p.m. 1:59PM

(Whereupon, the deposition continued on the record.)

Q Did the team that was looking at transport fate source and dynamics conduct any modeling work in the watershed? 2:00PM

MS. COLLINS: Object to form and direct the witness not to answer. You're inquiring directly into the subject matter, the work product of a consulting expert which the magistrate just directed this witness did not have to answer those questions at this time. 2:00PM

MS. BURCH: And for the record, I'm answering -- I'm asking these questions with that understanding, but with the direction that I ask the questions that I want answered and --

MS. COLLINS: Okay. 2:00PM

MS. BURCH: -- and he will rule on those issues.

A -- so based on the recommendation of counsel, I will not answer that question.

Q Did that team reach any conclusions about the contributions of poultry or any other source of phosphorus or any other contaminants to the waters of the Illinois River Watershed? 2:00PM

MS. COLLINS: I'm instructing the witness not to answer on the same basis. 2:00PM

A And based on the direction of counsel, I will not answer that question. 2:01PM

Q Did the team do any analysis of fate and transport of any pollutant, including phosphorous or bacteria or any other contaminant to the waters of the Illinois River Watershed? 2:01PM

MS. COLLINS: I'm directing the witness not answer on the same basis and also, for the record, it's your choice to spend the rest of this afternoon if you are waiving your opportunity to ask questions on the underlying report, that has been disclosed and that is your choice. However, we will not consent to providing any additional time on the subject matters that should have been covered in this deposition. 2:01PM

Q Okay. 2:01PM

A Based on the direction from counsel, I will not answer that question.

MS. BURCH: Would counsel like to simplify the process by agreeing that anything related to the work of this fate and transport source dynamic team or any other consulting team that he worked with I'm not going to be able to ask any questions about that work? 2:02PM

MS. COLLINS: I -- yes. I believe the guidance we just received from the Magistrate was that the witness would not be required the answer those questions today and that that would be saved for a later date, so if we can stick with that, yes. 2:02PM

MS. BURCH: Okay, thank you.

Q I believe we were talking last about the work of Katy Palmquist, is that the right name? 2:02PM

A Yes, it is.

Q And did Katy Palmquist do any work on anything other than the BMI opinions contained in the report?

A She did some work, but it was very limited work with Mike Kierski, who was working on the fish section of the report. 2:03PM

Q Now, did you -- with regard to Katy Palmquist's work, did you review all of the analysis and the underlying data that she used in conducting her analysis? 2:03PM

A No, I wouldn't say that I reviewed all of the underlying data, no.

Q Did she create -- did she provide you with all of the materials she created in conducting her analysis?

A That is difficult for me to answer because it would -- I don't know all the materials she might have created or the intermediate steps that she may have had in compiling data, so I can't say that. 2:04PM

Q Well, the BMI data that she reviewed is the data from the state's database, is that correct? 2:04PM

A That's correct. 2:04PM

Q Did you review all of that data?

A I looked at it but I didn't review every data point in it.

Q Did you do -- did you do the -- any of the BMI analysis yourself? 2:04PM

A No, I did not.

Q What -- how were the results of her analysis provided to you?

MS. COLLINS: Object to form. 2:05PM

A They were provided in -- in summary form as presented in -- in the report to be used in drafting sections of the report.

Q Would she have additional documents in her possession beyond just the results related to the BMI analysis? 2:05PM

A I don't know.

Q Did you see anything else besides that?

MS. COLLINS: Object to form.

A I don't recall seeing anything additional. 2:06PM

Q How did you collect her analysis to make sure it was done properly?

A I did not. It's my understanding that she had -- she did some other checks on it, other independent checks, but I did not actually check her computations 2:06PM

or analysis.
Q Would there be spreadsheets associated with her calculations?
A There may be.
Q Would any of that type of underlying information for these analyses have been provided to us, the State of Oklahoma? 2:06PM
A I don't know.
Q Did you provide it to us?
A I did not. 2:06PM
Q What information in your considered material is there that would allow me to understand and check how these calculations and analyses were done?
A I don't -- I don't believe that is there where you could see the -- in anything provided or considered 2:07PM materials, I don't believe that that information would be there.
Q Do you know whether all of the available data from the state's database was actually included in the calculations or analysis that she did for the BMI data? 2:07PM
A I don't know whether all of it is included. My understanding was that if we had data for a particular station we were -- we were going to use all of the data for that station.
Q How did you come to that understanding? 2:08PM

A It was only in my discussions with Ms. Palmquist. 2:08PM
Q Did she tell you that she didn't reject any of the data?
MS. COLLINS: Object to form.
A I don't recall her saying that she had rejected 2:08PM any data.
Q Did she affirmatively say that she did not reject?
A I don't recall that either.
Q Did she do a QAQC on any of the data?
MS. COLLINS: Object to form. 2:08PM
A It's my understanding that she did.
Q What were the results of that analysis?
A I don't -- I don't know the results.
Q Can I -- can I see her analysis of the QAQC in any of the materials you've provided to us in this case? 2:09PM
A I don't believe any materials related to -- to those evaluations have been provided.
Q How much of this text in your reports related to BMI did you write yourself?
A I couldn't say exactly. I think that Dr. 2:09PM Palmquist did an initial draft and then I worked with her on -- on redrafting and rewriting. I did not draft any of the original language, but I supplemented it and revised it with her to -- to represent my interpretations of the data. 2:10PM

Q Did you change any of the conclusions? 2:10PM
MS. COLLINS: Object to form.
A I don't recall changing any conclusions that were in the original draft.
Q So, for example, if you were to ask you a question like the one I'm getting ready to regarding the taxa anomic level analysis conducted on -- and reflected on Page 5-11, could you tell me how -- let's go there. I want to ask you a couple of questions about it. 2:10PM
A Okay. 2:11PM
Q In the first paragraph it indicates there's some standard operating procedures included in the Darren Brown expert report, correct?
A Yes.
Q Then the second paragraph there's a conclusion that, "Of the total taxa identified in 2005, 4.2 percent were identified to the species level and 70.5 percent to the genus level with the remaining specimens identified to the familial level or higher." How was that 4.2 percent of taxa identified for the species level calculated? 2:11PM 2:12PM
A It was my understanding that she did that at my direction, that -- that she evaluated the total number of taxa collected during that event and then just went through the list and determined the number of taxa from 2:12PM

that -- from the total list that were identified to the 2:12PM species level and reported that as a percentage.
Q Did you check whether she did that correctly?
A No, I didn't.
Q How was taxa richness calculated? 2:13PM
A Taxa richness?
Q Mm-hmm.
A Was the total number of species occurring -- total number of taxa occurring in a particular sample.
Q Did you check any of that analysis to see if that was done correctly? 2:13PM
A No, I didn't.
Q How were the Shannon diversity index numbers calculated?
A Those were calculated by, um, determining the 2:14PM proportion of each -- the proportion of the total numbers of organisms in each sample for each species and summing -- summing those and then multiplying that times the natural logarithm of that portion of -- proportion of the total taxa comprised of each of the 2:15PM taxa in the sample. And actually it's the negative summation because of the logarithm in there results in a negative number.
Q And so in the -- on Page 5-14 of your report, it indicates that Shannon indices for the Illinois River, 2:15PM

some BMI communities sampled in the summer of 2005 ranged between 1.74 and 2.97. Where -- which location had a Shannon indices of 174?
A I don't know.
Q How can I find out? 2:16PM
A Well, that would require a -- a table of the individual Shannon-Wiener calculations.
Q Does that exist?
A I believe it does.
Q Where? 2:16PM
A I believe it would exist -- if it exists now, it would be in Dr. Palmquist's files.
Q But how can I determine that location? Do I have Dr. Palmquist's files?
A No, I don't believe you do.
Q Can I tell from any of the terms you provided to us from -- what the values in between 1.74 and 2.97 for the 2005 BMI communities actually are?
A No, I don't believe you can.
MS. COLLINS: If you would like to make a request for those materials, I will undertake to find them for you to the extent that they exist and I imagine that they should. Save you the time of asking each of those questions.
MS. BURCH: Were you going to do an

additional deposition on those, I don't have them now when I'm here so --
MS. COLLINS: I do not.
MS. BURCH: So do you want to propose something with regard to that?
MS. COLLINS: I would like to see what material would be available before I would propose anything.
MS. BURCH: Okay. Well, given that, I think I need to identify where I do and don't have the information we need, unfortunately.
Q Was abundance calculated for each of the sampling sites in each year in the Illinois River Watershed?
A I believe it was, yes.
Q Are the results of that reported in your expert report?
A They are in -- on the paragraph, bottom paragraph of 5-14, as well as in Table 5-4.
Q So on 5-14, I see average abundances, is that correct?
A Yes, that's correct.
Q Come look at Table 5-4. These look like averages, minimums, maximums and medians for 2005 and 2006, is that correct?
A Yes. Yeah, it's a summary of the -- of the

results. It's a summary table.
Q It looks like on the next page there was 2007 data?
A That's correct.
Q Can I identify the abundance at any particular site by either information at Table 5.4 or 5-14?
A Not from this table nor the text.
Q How do I check whether those were -- those averages and maximum, minimums, and medians were calculated without having access to the individual values?
MS. COLLINS: Object to form.
A I don't think you could without having the individual values.
Q Are those provided someplace else in your report or considered materials?
A No, they're not.
Q If I ask you similar questions related to relative PPT, diphtherin abundance, would I get the same answer in terms of where I would be able to locate the individual sampling site values?
MS. COLLINS: Object to form.
A That's correct.
Q Are there any individual values for the benthic indicator species analysis that you did on 5-16?

A There's not a breakdown of all the analyses. Results presented here are a summary analysis of -- summary presentation of those data.
Q Is the underlying information provided in your considered materials or any place else in your report?
A Not to my knowledge.
Q Where are the calculations that -- that led to the HBI values that are presented in summary form on 5-16 and 5-17 in your materials?
A It would be a similar situation with the others, that Dr. Palmquist calculated those HBI scores.
Q And it's accurate to say I don't have access to the underlying information or analysis?
A Well, the underlying data were the -- the files of the State's results but the intermediate calculations to arrive at this, I don't believe you have.
Q Do you know whether all of the State's data was used for these HBI calculations?
A I did not do a sample by sample check to confirm that, no.
Q Would the situation be the same with the phosphorus specific nutrient biotic indices?
A That's correct.
Q Who did the relationship to subbasin size section that starts on 5.18?

A That was done by Dr. Palmquist with -- working in 2:23PM
conjunction with Mr. O'Boyle.
Q Who did the comparisons to urban land use?
A The answer would be the same, the same two
individuals. 2:24PM
Q How were urban land uses identified?
A I don't recall the, the data set we used. We
independently accessed some estimates and, as I recall,
they compared closely with the same percentages of
urban land use that Dr. Stevenson had used. I don't 2:24PM
recall as I sit here today where -- where those
estimates came from.
Q Were actual urban sites identified in the watershed?
MS. COLLINS: Object to form. 2:25PM
A As I recall, the information that we accessed
there, it just estimated the -- the total area of land
that was of an urban nature.
Q How do you define urban?
A We did not independently define it. As I recall, 2:25PM
we accessed the source of data but I can't remember
what it was that -- where urban land use, urban areas
were identified as a proportion of -- of the available
land along with other categories.
Q Is that data source provided in your considered 2:25PM

materials? 2:25PM
A I don't know. I would have to check on that.
Q And this analysis was done by Dr. Palmquist as well, is that correct?
A Yes, it was. 2:26PM
Q Who did the analysis that was contained on 5-20 of your report that is entitled BMI communities in the main stem of the Illinois River?
A That section was also worked on primarily by -- in
fact, I think entirely by Dr. Palmquist. 2:26PM
Q How long has Dr. Palmquist work at Exponent?
A I think it's a little over two years. Two, maybe
two and a half, approaching two and a half years.
Q Where did she work before that?
A She was working on her Ph.D. at Oregon State 2:27PM
University.
Q Do you know whether Dr. Palmquist had ever conducted an analysis like she did here in any other watershed in the United States?
MS. COLLINS: Object to form. 2:27PM
A I do know that in her graduate work she was
working with benthic macroinvertebrates in stream
systems in Oregon. I'm not familiar -- I don't recall
her working on any other systems with benthic
macroinvertebrates. 2:28PM

Q Do you know whether she had ever worked with a system impacted by nutrients and streams which are of the character of Ozark streams? 2:28PM
MS. COLLINS: Object to form.
A I don't know. 2:28PM
Q On Page 5-22 under summary, it says overall BMI communities sampled in the Illinois River System are indicative of a healthy viable ecosystem and do not suggest evidence of degradation or stress resulting from nutrient enrichment within the basin, is that correct? 2:29PM
A Where -- could you direct me to that again on 5.
Q 5-22?
A Oh, mm-hmm.
Q Did I read that correctly? 2:29PM
A Yes.
Q What should a healthy viable ecosystem look like in the Illinois River Watershed?
A In this case, I'm making a statement about the use
of BMIs -- BMI communities as being indicative of an 2:29PM
ecosystem. In other words, that particular group that
is sensitive to degradation or stress resulting from
nutrient enrichment appears to be -- it appears to be
diverse, it has many sensitive species, it has very
important indicator taxa, like -- that are referred to 2:30PM

as EPT taxa and it does not display the characteristics 2:30PM
that would be associated with a -- with a stressed or
degraded system.
Q When you're making that statement, are you comparing it to other Ozark region streams or are you comparing it to streams that exist in the world? 2:30PM
A I'm comparing it -- as I indicated, there's --
there are very limited comparisons available with the
designated reference streams that were part of the data
set, but that's why I think it was important to also 2:31PM
just look at the communities in general, to step back
and look at the presence or absence of certain kinds of
indicator species and take a broader look at the
communities that exist in the Illinois River system.
Q I guess my question is: When you're saying it looks like a good healthy system based on the benthic macroinvertebrate populations, are you comparing the populations which you saw to what should be in an Ozark system or what should be in any stream in the world? 2:31PM
MS. COLLINS: Object to form. 2:31PM
A The taxa benthic macroinvertebrates that occur in
this area have been studied elsewhere as far as their
responses to stress -- habitat stress and water quality
stress. And so I was looking at a broader context at
the taxa -- the abundances, the relative abundances of 2:32PM

those -- of those various taxa as occurring -- not only 2:32PM
making some general comparisons with Little Lee Creek,
for example, but looking broadly across all the
stations and looking for effects of water quality
degradation like I talked about before where the 2:32PM
communities might be dominated by a few tolerant
benthic taxa that would indicate that the system was
highly stressed and was not functioning as a -- what
you might call a more normal benthic community.
Q Do benthic communities differ by Eco region? 2:33PM
A They do. There is variability, yes.
Q What research did you do into what a benthic community should look like in the Ozark highlands region?
MS. COLLINS: Object to form. 2:33PM
A I didn't make any specific comparisons, as I
recall, with what that community should look like. As
I indicated, I don't think even though I made general
comparisons with the reference stations and Little Lee
Creek, I did not believe that I had information at 2:33PM
my -- at my hands that I could find that would serve as
a valid scientific reference station comparison and
that's why I took this broader look at the kinds and
numbers of species that occur in the samples.
Q And what did you compare that to? 2:34PM

A I compared it to what is known about the 2:34PM
tolerances of those species.
Q What is known about the tolerances of the species? I'm not sure I understand.
A What is -- what is documented in the literature as 2:34PM
far as the -- the sensitivity of those species and --
and their -- their documented occurrence relative to --
relative to stress, especially stress in the forms of
nutrient enrichment. For example, the so-called EPT
taxa have been documented in the literature as being 2:34PM
very sensitive to -- to water quality effect, including
nutrient effects and the relative abundance of EPT taxa
is a -- is a valuable indicator of the overall quality
of the water and the functioning of the benthic
community. 2:35PM
Q What is the -- what is the basis for your opinion that EPT in this region is a good indicator of nutrient enrichment?
A Well, I -- there are a number of articles, and I
would have to look at them, that have documented the 2:35PM
value of looking at EPT taxa and have documented that
it is -- that that particular metric is a valuable and
sensitive indicator of stress to a benthic community.
Q Of stress, is that correct?
A Well, of stress, including the stress from excess 2:36PM

nutrient enrichment and eutrophication. 2:36PM
Q Have you -- have you seen or reviewed any research regarding EPT communities that are found particularly in Ozark regions and whether they react in the same way to nutrient enrichment? 2:36PM
A I would have to check some of the articles that
I'm aware of because I do remember a number of articles
I've reviewed that document the sensitivity of EPT and
I would have to go back and check on whether any of
those were specifically about communities in the Ozark 2:36PM
regions or whether they were speaking more generally of
EPT taxa.
Q To your knowledge, did Dr. Stevenson do a year-to-year evaluation of the BMI data?
MS. COLLINS: Object to form. 2:37PM
A When -- well, he evaluated different years. I
don't believe -- I don't think he evaluated
year-to-year changes, as I recall. I don't remember
that. As I recall he -- but he did analyze the
separate years and had separate analyses of the -- the 2:38PM
individual years.
Q So, for example, to your knowledge, did Dr. Stevenson look at the 2006 BMI data and try to compare to it the 2007 data?
A As I recall, he discussed differences. I don't 2:38PM

remember the specifics but differences in his 2:38PM
analytical results for 2006 versus 2007.
Q What was the difference?
A I would have to go back and refer to his report.
I can't remember the details. 2:38PM
Q Did you see differences between the spring 2007 data and the summer 2006 BMI data?
A Yes, I did.
Q And what differences did you see?
A The spring 2007 data were different than the -- 2:39PM
the summer of 2006 data in that there were higher
abundances of dipteran larvae, dipteran fly larvae and
that resulted in different community characteristics
than between -- as measured between the two years.
There was also a difference in, as I recall, in the 2:39PM
relationship to, I believe, of urban -- urban land use
that was detected statistically significantly so in two
thousand -- in the spring of 2007, but was -- but was
not evident in the summer of 2006.
Q And why do you think that is? 2:40PM
A Why do I think what is?
Q Why do you think that that -- that there's a difference?
MS. COLLINS: Object to form.
A I think it had to do with simply the time of 2:40PM

sampling, that benthic communities do vary throughout the year and the -- the benthic communities in the spring can be different than the benthic communities that would exist during the summer. The spring is a time when many aquatic insect larvae are emerging as adults, mating and then laying eggs, and so that samples of -- taken in the spring, there's always the potential to have a very different representation of the communities because if a particular taxonomic group has recently emerged because there are a lot of emergences going on in the spring, then either the eggs or the new, the young, larvae of that species may be so small that they pass through the mesh of a -- of a sampling device and may not be represented in the samples. That is why I believe it's -- it's generally more appropriate to sample during stable conditions in the summer or late summer than it is in the spring because of that potential variability.

Q Is that when you're trying to compare the two?

A I believe that the -- the sampling in the summer not only for comparative purposes but even if you're taking a one-shot look at -- at the benthic communities that the summer or late summer or early fall is the best time to sample.

Q Is it -- what if you want to know what the benthic community is like in the spring though?

A If you want to know what the annual changes are, then -- then it is appropriate to sample throughout the year. Maybe during four periods or even during six periods. If that is a specific attempt to -- a goal to identify annual cycles and changes in the benthic community, then sampling at other seasons may be appropriate.

Q I guess my question is: What if you just want to know what they look like in the spring?

A Well, then you would sample in the spring.

Q And if you want to know what they look like in the summer, when would you sample?

A I would sample in the summer. The problem with -- with having a goal like knowing what they look like in spring is that depending on the week when you sampled in the spring, because the communities are so dynamic at that time, there's a potential to just have a snapshot and it may not be really telling you what they look like in the spring. It may be just telling you what they look like during one week in the spring because of that, the potentially unstable nature of those communities during that period.

Q Do I remember correctly that Melanie Edwards did the statistical analysis contained in your expert report?

A That's correct.

Q Do you have -- did you have access to any of the underlying information relating to that statistical analysis or were you just provided with summaries?

A I just looked at summaries.

Q Did you check the analysis?

A I did not independently check them, no.

Q Do you know whether that underlying information has been produced to us?

A I don't know for sure, but I know it was not part of my files.

Q Who is Michael Kierski?

A Dr. Michael Kierski is a -- an ecologist in -- who lives in Wisconsin. He's a -- a scientist on our staff, mainly specializing in fresh water biology.

MS. COLLINS: Can we go off the record for a second?

THE VIDEOGRAPHER: We are now off the record. The time is 2:45 p.m.

(Whereupon, a discussion was held off the record.)

THE VIDEOGRAPHER: We are back on the record. The time is 2:46 p.m.

MS. BURCH: I guess we've started. Do you want to start?

MS. COLLINS: Well, yes. I'd like to mark these as Exhibit 3 actually. And let the record reflect that I've handed to Ms. Burch some documents now identified as Exhibit 3, which are the invoices for Dr. Ginn's work from September 2008 until January 30, 2009. These were intended to be included in the prior production, but were for some reason missing. And are -- will be produced and Bates numbered after the deposition, but I wanted to provide those to the State to aid with this line of questioning that has currently been undertaken.

MS. BURCH: And when you say that they were intended to be in a previous production, is that the original production?

MS. COLLINS: Yes, actually.

MS. BURCH: Do you have another copy that I could use or --

MS. COLLINS: You can use this one.

MS. BURCH: Okay. I would mark these as Exhibit 3 to the deposition. I'm not going to use them for anything right at this second, but they are marked. Have the invoices prior to this all been produced?

MS. COLLINS: No. The invoices relating to the time frame in which Dr. Ginn was a consulting

expert have not been produced. 2:48PM
MS. BURCH: Okay. I'm going to add that to the motion.
MS. COLLINS: I thought you would.
MS. BURCH: Yeah, okay. 2:48PM
Q So can you tell me what Michael Kierski does? You tell me he was an ecologist from Wisconsin, is that correct?
A Yes.
Q And what did he do in this matter? 2:48PM
A He was primarily responsible for the -- the underlying analyses in the section on fish in the same manner that Dr. Palmquist worked on the underlying analyses for the section on benthic macroinvertebrates.
Q Did he actually draft -- provide you an initial 2:49PM draft of the fish section of your report?
A He did.
Q Did you change any of the conclusions?
A I don't recall changing any bottom line conclusions, no. 2:49PM
Q Did you review the underlying analysis or did you review the summaries that he provided you?
A I reviewed the summary information.
Q Has the analysis information that underlies his work on -- on fish been provided in your considered 2:49PM

materials to the State? 2:50PM
A It was not part of my -- my files so I suspect that it was not provided in considered materials.
Q So potentially to state at this time, if I were going to go through the fish section and ask you for 2:50PM information underlying the summary conclusions and how I could look at that information, would I get the answer that that's not in the materials provided?
A I believe that the answers would be the same as I gave you for the benthic macroinvertebrate section. 2:50PM
Q What is Michael Kierski's background?
A He has a Ph.D. in ecology, I believe, and is -- he works with both fish and invertebrate communities in his assessments. He's -- I would say he does primarily focus on work in ecological risk assessments. 2:51PM
Q How long has he been employed by Exponent?
A Let's see, I think he would have joined Exponent somewhat over three years ago, maybe almost three and a half years.
Q And where was he before that? 2:51PM
A He was with a company called Menzie, M-E-N-Z-I-E Cura, C-U-R-A, Associates and Exponent wasn't officially an acquisition but there -- we hired many of the staff from that firm and so he was part of that firm and -- and most, if not all, of the biologists 2:52PM

from that firm joined Exponent at that time. 2:52PM
Q Do you know whether he's ever done any work with fish populations in Ozark streams?
A I don't know.
Q I may have asked you this already, but did you -- 2:52PM did you check his analysis for accuracy?
A I did not do an independent check of his analysis.
Q Do you know how long he was at Menzie Cura before he came to Exponent?
A No, I don't. I do know that he was with another 2:53PM consulting firm in the upper midwest before joining Menzie Cura, but I don't know the exact timing of that transition.
Q What did Betty Dowd do in this case?
A Betty Dowd is a graphics specialist and she and 2:53PM some of her support staff were responsible for producing many of the figures, except for maps, which I indicated that Mr. O'Boyle prepared.
Q And what did Patti Warden do?
A As I think I indicated previously, she was the 2:53PM editor for working on this project.
Q Going back real quick to Michael Kierski, did he do the analysis related to Lake Tenkiller?
A No, he did not.
Q Who did that? 2:54PM

A I did that. 2:54PM
Q Did you have any help with analyzing the data on that?
MS. COLLINS: Object to form.
A I don't recall any help, other than perhaps some 2:54PM assistance in obtaining some documents, but I don't even -- I don't have a specific recollection of that.
Q What did Kristy Kaesler do?
A She is a data management specialist so she would have worked with the actual data in a database and 2:54PM doing retrievals of data for the individual scientists working on the team or for preparing data files to be analyzed by Ms. Edwards.
Q I think we went over this and if we did, just let me know, Linda Ziccardi, what did she do on the case? 2:55PM
A Ms. Ziccardi was working with me during the -- the consulting phase of the project. She did not have any significant involvement, as I recall, after the transition to the expert witness phase.
Q And what was her role during the consulting phase? 2:55PM
A Assembling and reviewing biological information.
Q And Sheryl Law, what did she do?
A Sheryl Law did a little bit of everything. She was working on the collection of information, the -- the organization of -- of information that we obtained 2:56PM

as part of the files from the State and, basically, she was assisting me and if I had a question about data or about a particular reference or anything else, I would rely on Sheryl to help me out. 2:56PM

Q Who's Fredrick Bodishbaugh, Bodishbaugh? **2:56PM**

A Dr. Bodishbaugh is a -- is a toxicologist and ecologist in the Belview, Washington, office of -- of Exponent.

Q What did he do on this case?

A I don't recall. I don't recall a -- a major involvement at all on his part, but I would have to -- maybe if I saw the invoices, I don't know, it might refresh my memory, but I'm not sure. 2:57PM

Q I'm holding the invoices which have been marked as Deposition Exhibit 3. I didn't realize I was doing that. I do not need to ask you a question about that, I'm just curious if you recall what he did. Who is Craig Amos? **2:57PM**

A I'm trying to recall what he might have been doing and all I can -- he is more of a general scientist and he must have been working at the request of -- of one of the other scientists, either -- either Dr. Kierski or Dr. Palmquist because I don't specifically recall what he was doing. 2:58PM

Q And who is Kenneth Cerreto? **2:59PM**

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A He had -- the same answer would be for him, I just don't -- I don't have direct knowledge of that. 2:59PM

Q And what about Taryn Sparacio?

A Yeah, she's a -- more of a general environmental scientist and the answer would be the same for her. 2:59PM

Q And what about Ramon E. Pierce?

A He is a -- a GIS specialist that reports or reported to Mr. O'Boyle.

Q Do you know how much you've been compensated for your work in this case? **3:00PM**

A Oh, when you say -- do you mean Exponent has been compensated?

Q Sure.

MS. COLLINS: Object to form. I direct you not to answer the question to the extent that the answer pertains to work product of other consulting experts at Exponent. To the extent your answer reflects your work as a testifying expert, please go ahead. 3:00PM

A Yes, my understanding is that for my -- my work on this project as a testifying expert, I think that total billings were something on the order of $323,000. 3:00PM

Q Okay. Let's go ahead and take a break.

THE VIDEOGRAPHER: We are now off the record. The time is 3:01 p.m. 3:01PM

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(Following a short recess, proceedings continued on the record.) 3:01PM

THE VIDEOGRAPHER: We are back on the record. The time is 3:19 p.m.

Q Do you know whether Exponent ever entered into contracts for consulting services which provide a discount in the event of a successful outcome in the litigation? **3:19PM**

MS. COLLINS: Object to form.

A Not to my knowledge. 3:19PM

Q Would you turn to your report at Page 1-1. In the second paragraph there's a list of five items, do you see that?

A Yes, I do.

Q Prior to that, there's a sentence that says, "In developing these opinions I've asked my counsel to address the following areas," do you see that? **3:20PM**

A Yes, I do.

Q Did counsel identify the areas that they wanted you to evaluate in this case? **3:20PM**

A As far as these general areas, yes, it was identified in -- based on my discussions with them, and their conclusion that that's what I should go ahead with as far as areas to look into.

Q And the first area is to evaluate available information on biological conditions in the aquatic environments of the Illinois River Watershed, including the Illinois River and its tributary streams in Tenkiller Ferry Lake, is that correct? **3:21PM**

A That's correct. 3:21PM

Q When you say "biological conditions" in that sentence, what do you mean why that?

A Well, what I mean there, based on our discussions, was just the biological conditions for benthic macroinvertebrates and fishes, not all biological conditions. 3:21PM

Q And did that include evaluations of water quality conditions?

A No, I was not doing a separate analysis of water quality conditions. 3:22PM

Q Did it include an analysis of periphyton phytoplankton, any sort of algae species?

A No, it did not.

Q In the second paragraph there, why were you asked to determine whether methods for conducting natural resource damage assessments under the DOI rules were followed by the State of Oklahoma? **3:22PM**

A Well, I don't know if I can answer all the reasons why, but I do recall being asked to, as I reviewed the information, in the State's expert's reports, to 3:23PM

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comment on whether I believed that they were following the kinds of information that -- that should be involved in a natural resource damage assessment according to the DOI rule. 3:23PM

Q Is the State required to follow the methods for conducting natural resource damage assessments described in the U.S. Department of Interior rule? 3:23PM

A No. As far as I know, they are not.

Q Did you do an evaluation of the relationship between the density of poultry houses in the Illinois River and the structure of fish communities at downstream sampling sites? 3:23PM

A Yes, I did.

Q Do you do that analysis yourself?

A That analysis was -- the answer is no, I did not. 3:23PM

Q Who did that analysis?

A That was done primarily by Dr. Mike Kierski.

Q And when you say "primarily by," was there additional work done in terms of GIS analysis?

A That's correct. That's what I was thinking about, that he would have had GIS support on that. 3:24PM

Q What did you do to verify that -- is it Dr. Kierski?

A Yes.

Q -- Dr. Kierski's statistical analysis and other 3:24PM

work to compare the density of poultry houses to the structure of fish communities was reliable? 3:24PM

MS. COLLINS: Object to form.

A I did do an independent evaluation of his analysis. 3:24PM

Q Who did the evaluation of the status of fish communities downstream of the Cargill contract grow and breeder operations in the Illinois Watershed?

A The answer would be the same, that was Dr. Kierski. 3:25PM

Q And what did you do to determine whether his analysis was reliable?

MS. COLLINS: Object to form.

A I did not do an independent evaluation of his analysis. 3:25PM

Q Did that analysis require statistic -- evaluation of statistical relationships?

MS. COLLINS: Object to form.

Q I mean -- let me start over.

Did that analysis require statistical analysis of various relationships? 3:25PM

A The --

MS. COLLINS: Object to form.

A That analysis -- that analysis involved -- did not involve direct statistical comparisons or statistical 3:25PM

tests, as I recall. 3:26PM

Q How was poultry house density calculated?

A That was calculated by -- from a data set that was supplied to us by -- by the defendants that, to my knowledge, had been developed by the defendants themselves and compiled and was transmitted to us as a -- as a spreadsheet. 3:26PM

Q What did you do to verify the accuracy of the information in that spreadsheet?

A I did not independently evaluate that spreadsheet for accuracy. 3:26PM

Q Did Dr. Kierski?

A Not to my knowledge.

Q Did you provide that spreadsheet in your considered materials? 3:26PM

A I suspect that we did not because I -- I did not have a copy of that spreadsheet on my computer, at least I don't recall it being on my computer.

Q Who did the evaluation of the approaches, methods and conclusions, in the report of Dr. Stevenson? 3:27PM

A That work was actually a collaborative effort between myself and Dr. Kierski and Dr. Palmquist.

Q When you were doing your evaluation of Dr. Stevenson's work did you rely on the work done by Dr. Kierski and Dr. Palmquist? 3:28PM

A In part, I -- we were -- we were collaborating on that. I was directing them in the kinds of assessments and the general area of comments that I thought were appropriate and they were doing some of the initial drafting of that section. 3:28PM

Q Did you draft any of the section of your report that contains the criticisms of Dr. Stevenson's analysis?

A I did parts of it, I can't recall exactly how much. I would say overall it was -- I would say the majority of it was probably initially drafted by Drs. Palmquist and Kierski. 3:28PM

Q In Section 6.2 of your report under Evaluation of Stevenson, there's a section called Statistical Approaches. Did you draft any of that section? 3:29PM

A Oh, that. I recall participating in that, but as I remember, that was initially drafted by Ms. Edwards, Melanie Edwards, the statistician that I identified.

Q Did you do anything to verify the accuracy of the analysis on statistical approaches? 3:30PM

MS. COLLINS: Object to form.

A I didn't do any underlying verification of any of the numerical information, but I certainly reviewed and considered and worked on the final drafts of that section. 3:30PM

Q What else did you do with regard to the statistical approaches section in Section 6.2 of your report? 3:30PM

MS. COLLINS: Object to form.

A Well, I also directed Ms. Edwards as far as the areas that I thought were worth looking into and that were -- that would warrant comments in that section. 3:30PM

Q Anything else?

MS. COLLINS: Object to form.

A Nothing else other than what I just told you in those various areas. 3:31PM

Q All right. Who wrote the Section 6.3, Inappropriate Characterization and Selection of Reference Stations?

A I don't recall. 3:31PM

Q Who wrote the Section 6.4, Relationship of BMI Communities to Stream Characteristics, Phosphorus and Poultry House Density?

A This is in Section 6? I believe that was initially drafted by Dr. Palmquist, but as I indicated, the three of us were jointly working on those and I don't recall always the -- who the -- who may have drafted the particular section. 3:31PM

Q Who drafted the Section 6.5, Relationship of Fish Communities to Stream Characteristics, Phosphorus and 3:32PM

Poultry House Density? 3:32PM

A I believe that Dr. Kierski did the initial draft of that section.

Q And who wrote the Section 6.6, Overall Summary of Stevenson? 3:32PM

A That -- I may have drafted that initially. I may have done it as a collaborative effort with other authors. I don't recall.

Q And that's section summarizes all of the work done by the statistician Edwards, Dr. Palmquist and Dr. Kierski? 3:33PM

A That's correct.

Q Did you undertake to evaluate the approaches, methods, and conclusions reached by Dr. Welch in the report of Cooke and Welch? 3:34PM

A Yes, I did.

Q And did you review all of the approaches, methods, and conclusions by Dr. Welch?

A I don't know if all of them were reviewed. All of them that were apparent to me to be his -- his opinions in that report, since it was a dual-authored report. I certainly read the whole thing, I don't know if every -- every part of his report was discussed here -- herein. 3:34PM

Q How were you able to distinguish which part was 3:34PM

written -- of the Cooke Welch report was written by Dr. Welch and which part was written by Dr. Cooke? 3:34PM

A Well, as I remember, there was a separation of -- of the opinions that were identified for each of them and there was some indication of the various sections that they had been responsible for in the report, so I based my judgment on what was -- what was in the report. 3:35PM

Q Dr. Welch issued some opinions on AHODs in Lake Tenkiller. Did you give any opinions or analysis or conclusions related to that topic? 3:35PM

A No, I did not.

Q He issued some opinions on total phosphorus concentrations in Lake Tenkiller. Did you issue any -- do any analysis or reach any opinions or conclusions based on that? 3:35PM

A No, I did not.

Q You make a statement about evaluating all of his methods, approaches, and conclusions. Which particular methods and conclusions did you actually review? 3:35PM

MS. COLLINS: Object to form.

A The first statement doesn't say "evaluate all of the," as you indicated. It says "evaluate the approaches, methods and conclusions."

Q Okay. 3:36PM

A Since my -- my charge in this matter was to focus on benthic macroinvertebrates and fish, as I reviewed this report and Dr. Stevenson's report, I conducted my evaluation of the -- the relevant information to those two biological assemblages. 3:36PM

Q Are total phosphorus concentrations not relevant to biological assemblages?

MS. COLLINS: Object to form. Asked and answered.

A As I indicated previously, I'm not saying that, but my evaluation was focusing on the -- the nature of the biological communities themselves that exist in -- in the streams and in the lake of the Illinois River Watershed. 3:36PM

Q Did you offer opinions on whether or not there had been impacts to those? 3:37PM

MS. COLLINS: Object to form.

A My opinions were based on the -- the available information and whether or not they indicated that these were -- were highly stressed or injured populations, but I did not conduct any evaluation with the exception of upstream poultry house density and evaluations of subbasin size and urban land use. I did not conduct individual assessments of any potential impacts of any pollutant sources, other than might be 3:37PM 3:38PM

associated with those factors. 3:38PM
Q That's true for Dr. Stevenson and for Drs. Cooke and Welch's report, is that right?
A Well, I was talking more about my -- my more affirmative opinions there. In my evaluations of their 3:38PM reports, I focused on their conclusions concerning the status or effects on biological communities in reviewing those and reviewing the information or the analyses that they used to reach those conclusions.
Q Let's take Dr. Stevenson for example. Do you 3:39PM think that Dr. Stevenson looked at filamentous green algae in assessing impacts to fish or benthic macroinvertebrates?
A Well, he looked at filamentous algae and I think he used -- he used, incorporated, as I recall, the 3:39PM occurrence of filamentous algae in some of his -- some of his regression analyses, although I don't remember the specifics.
Q So do you think that he looked at filamentous green algae in evaluating impacts to benthic 3:39PM macroinvertebrates and fish in the Illinois River Watershed?
A Well, as I indicated, I think he had -- there was a filamentous algae factor that he evaluated in his analysis of the other biological groups. 3:40PM

Q Did you look at that? 3:40PM
A No, I did not.
Q And so what I'm trying to understand is -- is which parts of their analysis relating to impacts to benthic macroinvertebrate and fish did you analyze? 3:40PM
A With regard to Dr. Stevenson?
Q Okay. We can start with him, sure.
A I evaluated his -- his overall -- the regression analyses he did and his -- his conclusions he reached regarding causal factors associated with changes in 3:41PM either benthic macroinvertebrates or fish communities.
Q Did that regression analysis include parameters related to filamentous green algae?
A I believe it did, as I said.
Q But you didn't look at filamentous green algae? 3:41PM
A No, I did not.
Q How did you review his regression analysis? Would you include information on filamentous green algae without looking at filamentous green algae?
A The regression analyses would still lend 3:41PM themselves to evaluation and interpretation relative to other potentially causal factors that were being evaluated without delving into that because I did not look at the filamentous algae, per se.
Q Did you look at anything other than his regression 3:42PM analysis?

MS. COLLINS: Object to form.
A Well, I looked at all of the information he used, for example, in looking at his percent changes in -- that he saw in various community metrics, so I was -- I 3:42PM was looking at everything that I thought was relevant to -- to my assessment.
Q Did you look at all of the metrics?
MS. COLLINS: Object to form.
A No, I did not. 3:42PM
Q You didn't review all of the metrics that Dr. Stevenson reviewed in reaching his conclusions, is that accurate?
MS. COLLINS: Object to form.
A Not individually, no. 3:43PM
Q Did Dr. Stevenson look at total phosphorous concentrations?
A Yes, he did.
Q Did you review that?
MS. COLLINS: Object to form. Asked and 3:43PM answered.
A I reviewed it. I did not comment on it or develop opinions on it.
Q Wasn't the -- weren't all of the metrics that Dr. Stevenson looked at and all of the water quality 3:43PM information that he reviewed important to his 3:43PM conclusions regarding the impacts of poultry on fish and benthic macroinvertebrates?

MS. COLLINS: Object to form.
A I don't know that they were all important. Some 3:43PM of his analyses showed apparent statistical significance and some did not. And I -- I had difficulty separating out or being able to really evaluate exactly what he had done in those analyses, so it's very hard to determine what was important and what 3:44PM was not.
Q So how did you select which of them to review?
MS. COLLINS: Object to the form.
A Some of them were certain factors that I remember him -- remember that Dr. Stevenson found as significant 3:44PM and I conducted some separate evaluations of my own just to evaluate whether or not those particular factors showed a significant relationship using -- using, basically, the entire data set that I had available to -- to do an independent evaluation of 3:45PM those factors.
Q Do you consider the other factors to be irrelevant to fish and benthic macroinvertebrate populations?
A Not necessarily, no.
Q Can total phosphorus concentrations impact fish 3:45PM

and benthic macroinvertebrates? **3:45PM**

MS. COLLINS: Object to form. Asked and answered.

A As I indicated previously, yes, phosphorus, if it's in sufficient concentrations over a sufficient time, there are a lot of considerations there, can stimulate alga growth and, at sufficient levels, can cause adverse effects. 3:45PM

Q Do you know whether the levels in the Illinois River are sufficient to cause adverse effects to benthic macroinvertebrates or fish communities? **3:46PM**

MS. COLLINS: Object to form.

A I have not looked at that as a relationship to concentrations. I have looked at it more as the communities of benthic macroinvertebrates and fish themselves and whether or not those communities show evidence of stress. 3:46PM

Q And that analysis was based on a comparison to -- to reference sites?

MS. COLLINS: Object to form. 3:46PM

Q Is that correct?

A As I indicated, in part comparison to the State's reference sites; in part in looking at various community metrics for both of these biological assemblages, and reaching overall conclusion, but it 3:46PM

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was -- it was multiple pieces of evidence that were used. 3:46PM

Q With reference to Dr. Welch's work in the Cooke and Welch report, which parts of his analysis did you review? **3:47PM**

MS. COLLINS: Are you referring to a specific part of his report, of Dr. Ginn's report?

Q I'm still on Page 1-1 where it says he evaluated the approaches, methods and conclusions reached by Dr. Eugene Welch in the report of Cooke and Welch. **3:47PM**

A In the areas that I focused on were comments by Dr. Welch on the -- the ecology of fishes in Lake Tenkiller and he also commented on the benthic communities of Lake Tenkiller.

Q Now, he looked at dissolved oxygen levels, correct? **3:48PM**

A Yes, he did.

Q And he looked at phosphorus concentrations, is that correct?

A He did. 3:48PM

Q Did he look at, I think it's called, hypoxic factor?

A Yes.

Q And he looked at AHODs, is that correct?

A Yes. 3:48PM

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Q Did he look at chlorophyll-a concentrations? **3:48PM**

A I believe he did, but for some of those I'm not sure where the separation was or the overlap between Dr. Cooke and Dr. Welch. It appeared to me that Dr. Welch was responsible for the work on fish and benthic macroinvertebrates. 3:49PM

Q Aren't all of those things I just -- we just discussed that Dr. Welch looked at relevant to fish and macroinvertebrate populations in Lake Tenkiller?

A Yes, they can be relevant, but the question is whether or not they appear to be causing injuries to -- to fish or macroinvertebrate populations in the lake. So the fundamental question comes down to, well, what do the fish populations look like and what do the benthic macroinvertebrate communities look like in the lake. 3:49PM

Q Is the violation of water quality standard an injury under the natural resource damage assessment regulations?

MS. COLLINS: Object to form. 3:49PM

A It's a defined injury as for -- for surface water resources.

Q Do you know anything about how much phosphorus loading there is into Lake Tenkiller?

MS. COLLINS: Object to form. Asked and answered. 3:50PM

A No, I don't know that number.

Q Do you know anything about the source of phosphorus loading to Lake Tenkiller?

MS. COLLINS: Object to form. Asked and answered. 3:50PM

A I know something about the sources, the potential sources of phosphorus to Lake Tenkiller.

Q What do you know?

A I've read information about a variety of potential sources, including municipal sewage discharges, including septic tanks or septic fields, including nurseries, including runoff from agricultural land, and runoff from urban areas. 3:50PM

Q And do you know whether there has been a contribution of phosphorus -- to phosphorus loading to Lake Tenkiller from the land application of poultry waste? **3:51PM**

MS. COLLINS: Object to form.

A I don't know. I have not conducted that evaluation. 3:51PM

Q Have you read anything about it?

MS. COLLINS: Object to form.

A I have, yes.

Q What have you read? **3:51PM**

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A Um, I've read materials alleging that there is a runoff from fields where poultry litter has been applied. I believe I read one literature article, and I don't recall where it was, that attempted to evaluate if there was runoff from, I think, experimental fields. 3:51PM 3:52PM

Q Do you recall the sources that you reviewed that you read this information in?

MS. COLLINS: Object to form.

A No, I don't.

Q Do you know whether waste water treatment plants are contributing phosphorus -- to phosphorus loading in the Illinois River Watershed? 3:52PM

MS. COLLINS: Object to form.

A I don't recall the details of what I read, but as I recall, I've read some -- some documentation of phosphorus in the -- in the effluence of waste water treatment plants. 3:52PM

Q Do you know whether it's contributing to phosphorus loading at Lake Tenkiller?

MS. COLLINS: Object to form. 3:53PM

A No, I don't.

Q Do you know whether septic tanks are contributing phosphorus loading to Lake Tenkiller?

MS. COLLINS: Object to form.

A No, I don't. 3:53PM

Q Do you know of any other runoff from agriculture land? 3:53PM

MS. COLLINS: Object to form.

A I have not evaluated any of those potential sources to loading at Lake Tenkiller. 3:53PM

Q Have you evaluated any of those sources with regard to phosphorus levels in the tributaries to the Illinois River?

MS. COLLINS: Object to form.

A No, I have not. 3:53PM

Q Can phosphorus, the phosphorus loading to Lake Tenkiller result in dissolved oxygen below water quality standards?

MS. COLLINS: Object to form.

A As I indicated, I've not done a comparison of dissolved oxygen levels in Lake Tenkiller relative to -- relative to state standard. Nor have I evaluated the relationship of phosphorus loading to any violations of DO standards, if they exist. 3:53PM

Q Starting on Section 2-1 of your report, there is a number list that continues through to Page 2-6. Is that a summary of all of your opinions in this case? 3:54PM

A It's a summary of my -- what I would call my major opinions. I wouldn't characterize it as a summary of all of my opinions because there may be many opinions expressed throughout the report. 3:55PM

Q Are all of the opinions that you plan to offer at trial in this case contained in this report?

A At this time, yes.

Q Have you been asked to do any additional work? 3:55PM

A No, I haven't.

Q Section 7 of your report is entitled Fishes and Macroinvertebrates in Tenkiller Ferry Lake, is that correct?

A That's correct. 3:55PM

Q And did you author all of Section 7?

MS. COLLINS: Object to form.

A I drafted that section. I may have had -- as I recall, I asked one or more others to review it, but the original drafting is mine. 3:56PM

Q Who reviewed it?

A I don't recall at this time whether it was Dr. Kierski or Dr. Palmquist or both.

Q Section 8 of your report, who drafted that?

MS. COLLINS: Object to form. 3:56PM

A I did.

Q Is Section 8 -- well, forget the question.

Also under your report are a series of figures and tables. Did you create any of the figures or tables in this report? 3:57PM

MS. COLLINS: Object to form. 3:57PM

A As I recall, I created the figures and tables that -- well, I shouldn't say that. The figures and tables that pertain to Tenkiller Ferry Lake were prepared directly under my supervision, even though I didn't draw them or produce them myself. In many cases, they were figures that I extracted from various data sources. Most, if not all, of the figures in other sections of the report were prepared under the supervision of either Dr. Kierski or Dr. Palmquist. 3:57PM 3:58PM

Q Did you do anything to verify the accuracy of the tables or figures that were prepared under the direction of Dr. Palmquist or Dr. Kierski?

A No, I did not do an independent evaluation of those figures. 3:58PM

Q And has the information underlying all of the tables and figures been provided in your considered materials?

MS. COLLINS: Object to form.

A I don't know. I think we've talked about some -- some original data that may be underlying tables or figures that I indicated I am unsure of whether or not it's been produced. It was not information that I had in my possession and to the extent that there were intermediate calculations based on the State's data 3:59PM 3:59PM

sets, those may not have been produced. 3:59PM
Q Did you conduct an ecological assessment of the streams in the Illinois River Watershed or Lake Tenkiller?
MS. COLLINS: Object to form. 3:59PM
A An ecological assessment?
Q Yes.
A In the broadest sense, in looking at the -- the ecological structure of those assemblages and the relationships to certain variables, but I would not 4:00PM call it comprehensive or definitive because not all the data were available that I would want to have for a -- a rigid ecological assessment.
Q Did you consider all of the data that exists for the Illinois River Watershed or some subset of that 4:00PM data?
MS. COLLINS: Object to form.
A I'm sure it's some subset. The data collected by the State and produced in the data files was the most comprehensive biological data that I had seen for the 4:01PM system, especially involving synoptic sampling of a wide variety of locations so that those data to me had a high priority regarding my evaluation.
Q I'm not sure I remember, it's getting a bit late in the day, but did I ask you whether you conducted an 4:01PM

ecological assessment of both the streams of the 4:01PM Illinois River Watershed and Lake Tenkiller?
MS. COLLINS: Object to form.
A I don't think you did.
Q Okay. Was your answer directed just to the 4:01PM streams of the Illinois River Watershed?
A Well, I don't think it was. The same answer would be there. There's also some uncertainty in my mind as far as what you mean by "ecological assessment." That's a fairly broad term and is -- not to my 4:02PM knowledge, is not well defined. What would constitute an ecological assessment? It could be interpreted fairly narrowly and it could be interpreted very broadly and it's not a term that -- that I would typically use. 4:02PM
Q Did you -- did you do a comprehensive assessment of ecological conditions in the Illinois River Watershed?
MS. COLLINS: Object to form.
A I don't -- I wouldn't characterize it as 4:02PM comprehensive in that I did not do separate evaluations of phytoplankton, separate evaluations of periphyton.
Q Anything else?
A Well, and I didn't have access to important habitat information for the 2006 and 2007 studies, 4:03PM

which for a comprehensive assessment would be required. 4:03PM
Q If you were doing a comprehensive assessment would you want to look at water quality data?
MS. COLLINS: Object to the form.
A I think for an overall assessment, integrating all 4:03PM factors that may be issues in the case, evaluation of water quality data is one important factor, yes.
Q Did you conduct a natural resource damage assessment?
A No, I did not. 4:03PM
Q Did your analysis follow the DOI regulations?
MS. COLLINS: Object to form.
A No, it did not.
Q Is your analysis adequate to determine injuries to fish and benthic macroinvertebrates in the Illinois 4:04PM River Watershed?
MS. COLLINS: Object to form.
A I don't think -- my analysis, I believe, went as far as it could with the available data, but I think the limitations in the available data, especially 4:04PM associated with some of those important variables that I identified earlier, precludes a definitive assessment of -- of injury due to any particular source.
Q What do you mean "due to any particular source"?
A Due to any particular source of the substance that 4:04PM

may be causing effects on those communities. 4:04PM
Q Can you -- under the NRDA regulations, when you identify an injury, is it necessary to identify a particular source?
A Well, I think it's necessary to identify a cause 4:05PM that is associated with that injury, that it -- that an injury is not just a change in some biological parameter, but it is a -- it's a measurable adverse change that results from the release of a hazardous substance. And that -- those words "released" or 4:05PM "caused by" or resulting from a release involves an assessment of the causal factors associated with any particular change.
Q Right. So in looking at Lake Tenkiller, could one determine injury by identifying, and I know you dispute 4:05PM the phosphorus as a hazardous substance, but let's assume just for the sake of discussion, could one identify phosphorus as the source of an injury --
MS. COLLINS: Object to form.
Q -- under the NRDA regs? 4:06PM
A Well, I would have characterized it as the cause of an injury. Are you saying the source -- as a -- I mean, phosphorus is a substance that would either be causally related or not causally related with an injury. 4:06PM

Q Right. So could one analyze the natural resource damage claim like this, that the release of phosphorus has resulted in an injury to Lake Tenkiller? 4:06PM

MS. COLLINS: Object to form.

A Well, I guess in theory the question would be which release of phosphorus, from which facility as the term is used in CERCLA may be causally related with any -- you know, any indicator of injury. 4:07PM

Q And do you believe that's necessary for the determination of an injury under the NRDA regs? 4:07PM

A Well, the determination of an injury is a -- that is an initial step, as I indicated before. That's the first process, first step in the real injury assessment process. The determination of an injury can be made by just simply a comparison with a particular arteriole or standard. There's a wide variety of metrics identified in the rule that can be used to determine an injury. 4:07PM

Q And so taking Lake Tenkiller, for example, could one determine whether there's an injury by looking at the amount of phosphorus being released into the reservoir and whether or not that amount of phosphorus was causing DO water quality standards to not be met? 4:08PM

MS. COLLINS: Object to form.

A I suppose as far as determining an injury to surface waters, which that would -- that category of 4:08PM

comparing with a standard would apply to, I suppose that an injury could be determined but the question is then how one would quantify that injury and how one might relate that -- that injury to any particular source of phosphorus. 4:08PM 4:09PM

Q Right. So what does quantifying an injury mean to you under the natural resource damage regs?

MS. COLLINS: Object to form.

A In the quantification step, the injury is characterized in both time, as far as the duration of the injury, and in space, how far that injury extends. And the determination is made as far as what is the -- what is the reduction in services associated with that particular resource when compared to base line conditions and base line being the conditions that would exist in that assessment area, but for any effects of the particular release being addressed, but including all other potential sources of that substance or similar stresses associated with either related substances or natural or anthropogenic factors that could be causing that kind of effect. Once that difference from base line is determined in the quantification step, then that incremental change can be translated into either monetary damages or restoration steps. 4:09PM 4:10PM 4:10PM 4:11PM

Q So your -- your opinion is that only the incremental step can be turned into a quantification -- I mean, into a damage estimate? 4:11PM

MS. COLLINS: Object to form.

Q Is that correct? 4:11PM

A Well, the goal is to look at the increment, the amount of the quantified injury associated with a particular release.

Q Earlier we talked about joint and several liability, is that correct? 4:11PM

A We did.

Q And is it, does -- in the context of a site with multiple responsible parties, when a natural resource damage assessment is done, is there a separate damage determination for each contributing source? 4:11PM

MS. COLLINS: Object to form.

A Well, and as I think I indicated before, when we get into joint and several liability, we're into a -- a legal terminology that I'm not sure I fully understand although I have a vague understanding of it. But I, if -- there are multiple PRPs. They are identified as PRPs. I do know that there's -- I've seen natural resource damages conducted where there is not an apportionment among identified PRPs. 4:12PM

Q Right. So at a site with multiple PRPs, have you ever seen a natural resource damage assessment that did a different damage determination set for each individual source? 4:12PM

MS. COLLINS: Object to form.

A There are -- I'm aware of attempts at that on ongoing cases and I'm also aware of, I believe, in the Hylebos case, which I mentioned yesterday, that part of the trustee's assessment included -- part of their damage assessment included an allocation scheme among the various PRPs in Hylebos Waterway. 4:13PM 4:13PM

Q Okay. So doesn't the allocations scheme happen after the damage determination phase?

A In many cases, yes, but I think there it was done as part of the -- part of the trustee's activities. It was part of their published materials concerning the case. 4:14PM

Q Does it have to be done that way?

MS. COLLINS: Object to form.

A No, you asked me if I knew of -- of examples but I am not aware of any requirement that that be done. 4:14PM

Q So in the Hylebos case, did they look at the injuries -- did they do an injury determination and quantification phase for each individual PRP?

MS. COLLINS: Object to form.

A No, they did not. 4:14PM

Q So when they were doing their analysis were they looking at the contribution of the hazardous substance from all of the PRPs and -- as an intermingle together to cause the injury? 4:14PM

MS. COLLINS: Object to form. 4:14PM

A I just don't -- as I said, I have not worked directly on that so I'm going based on my recollection of some of the -- the published trustee documents that I've seen and I believe that the allocation effort was done separately and subsequent to the overall injury 4:15PM assessment.

Q When you're talking about quantifying injuries in time and space taken at Lake Tenkiller and dissolved oxygen standard -- well, let me define the term real quick. When I say "a violation of a standard," do you understand what I mean? 4:15PM

A Yes, in general terms.

Q Do we agree that that means that the standard is not being met in the water body?

A Yes. 4:16PM

Q So taking Lake Tenkiller as an example, if dissolved oxygen standards were not being met, how would you quantify that injury?

MS. COLLINS: Object to form.

A Well, I think that there's a challenge there to 4:16PM

quantify that -- that kind of an injury, especially in 4:16PM terms of services provided by that particular constituent or trying to look at what services might be diminished relative to base line because of that particular standard not being met. So the question in 4:16PM a situation like that is whether or not there is an attempt to value that injury intrinsically for the value of that water, let's say, per se, because you're looking at there being an injury to surface waters, assuming your example. The other question is, well, 4:17PM does that -- does that violation of the standard cause a reduction in services for some other -- some other group, either a biological group or to humans using that water body. So I've seen those kinds of quantifications done both ways, looking at the resource 4:18PM itself or looking at services provided to either biological communities or to humans.

Q So it can be done both ways under the DOI regulations?

MS. COLLINS: Object to form. 4:18PM

A Well, the -- I'm not sure about the former approach. The former approach involves some considerations of services that are -- that I think, you know, are challenging. So I don't know about both ways. I said -- I said I've seen it done both ways. 4:18PM

Q Stepping back a step before we get to reduction in services, how would you quantify the injury in time? 4:18PM

MS. COLLINS: Object to form.

A The classical way to do it is to look at the date of the first documented release from the facility. 4:19PM There are some considerations of whether or not that release in the -- and any resultant injury may have occurred wholly before the enactment of CERCLA in December of 1980, and in some cases I've seen trustees rather than try to cast back, I guess, too far, to just 4:19PM start injuries -- in a temporal sense, start injuries with the date of enactment of CERCLA. And then, basically, account for any injuries on an annual basis until such time as the -- the services for that resource are returned to base line conditions. 4:20PM

Q And how do you quantify -- we've got to go on a break. I'm so interested. Sorry about that.

THE VIDEOGRAPHER: We are now off the record. The time is 4:20 p.m.

(Following a short recess, proceedings 4:20PM continued on the record.)

THE VIDEOGRAPHER: We are now on the record. The time is 4:37 p.m.

Q Can I refer you to Page 5-48 of your report? Is that where the analysis -- your analysis relationship 4:38PM

to Cargill contract grower/breeder operations is located? 4:38PM

A That's correct.

Q Did you evaluate IBI scores in relation to Cargill contract growers? 4:38PM

A Yes, I did.

Q And how did you identify Cargill contract growers?

A That information was supplied by Cargill.

Q And did you review that information yourself?

A No, I did not. I mean, I did not personally 4:39PM review that information.

Q Who did?

A That was primarily Mike Kierski, but assisted by Randy O'Boyle with mapping the information.

Q Did Dr. Kierski or Randy O'Boyle do anything to verify the accuracy of that information? 4:39PM

A Not to my knowledge.

Q I think we might have covered this before, but is that information regarding the location of contract -- Cargill contract growers been provided to the State in your considered materials? 4:39PM

A The -- as I recall, the locations are plotted on a map in my report. I don't think there is anything else that's been provided.

Q Would you refer to the middle paragraph on Page 4:40PM

5-48? There is a statement there regarding 92 percent of the stations located closest in a downstream direction from one or more Cargill contract growers' or breeders' operations, do you see that? 4:40PM

A Yes, I do. 4:40PM

Q That indicates that 92 percent had an IBI score that were classified as either fully supporting a cool water aquatic community or a score indicating that full support was undetermined. Is that correct?

A That's correct. 4:40PM

Q What percentage of those stations had a score that full support of the water quality standard was undetermined?

A I don't recall that separation.

Q How can I determine that based on the information that you have provided either in your report or considered materials? 4:41PM

MS. COLLINS: Object to form.

A I don't believe that information is in here.

Q If you were unable using an IBI score to determine that a location was fully supporting its beneficial use of a cool water aquatic community, do you know whether or not there's an impact at that location? 4:41PM

MS. COLLINS: Object to form.

A If it falls in the range where it's undetermined? 4:42PM

Q Yes. 4:42PM

A My sense is that if it falls in that area then it's important to -- to start to look at other factors, especially habitat factors to see -- to see if there's any explanation of what -- what might be happening but that range is just what it says, it's undetermined as far as where there is -- those beneficial uses are being supported. 4:42PM

Q Does the IBI provide direction for what you do after you identify a site where that full support was undetermined? 4:42PM

A I don't recall if there's anything stated.

Q What makes you believe that you should primarily look at habitat issues?

A Well, because that's -- that's one factor that could be causing, especially in very small streams, that could be limiting the IBI and resulting in a lower numeric value just because of the very limited nature of a habitat in -- in a very small stream with a small drainage area. 4:43PM

Q Are all of the locations which had a score indicating that full support was undetermined in small streams?

MS. COLLINS: Object to form.

A Well, I think, as I indicated in the next paragraph there, that there were -- I don't know about all, but there were certainly a number that were in -- in small subbasins and there was only one station that was below the value of 29 indicating non-support and that was in a small subbasin. 4:44PM

Q Well, how many of the areas indicating that full support was undetermined were in small subbasins?

A It doesn't tell the actual number that I can see.

Q Do you have any way to determine that?

A I would have to -- I would to have look at the actual scores for each one of the stations. 4:45PM

Q And where can those be found?

A I would have to -- they would be found in a data file associated with these calculations, but I don't know where that data file might reside. 4:45PM

Q Can I -- and I assume that that data file was not provided to you or, as a result, to the state, is that correct?

MS. COLLINS: Object to form.

A I don't have it, no. 4:45PM

Q Could water quality be a reason that full support might be undetermined?

MS. COLLINS: Object to form.

A Yes, it could be. It could be water quality or it could be habitat. 4:45PM

Q Do you know which is the case here? 4:46PM

MS. COLLINS: Object to form.

A I suspect it's habitat because of these -- the very small -- small subbasin sizes and because the -- the relationships between changes in fish communities and subbasin sites are -- are fairly well established in the literature that there -- some of these small subbasins could be very limited habitats because of the intermittent nature of some of the streams and the limited habitat available for fishes. 4:46PM

Q Do you know whether there's limited habitat at the sites where you found that full support was undetermined?

A Only with regard to the -- the very small nature of the drainage basin and associated streams. 4:47PM

Q How many of the ones where full support was undetermined by various quantities?

MS. COLLINS: Object to form.

A As I said, that number is not in here.

Q How many of these streams are intermittent in nature? 4:47PM

A I can't tell you exactly which ones are intermittent, but I have in my visits to the Illinois River Watershed, some of these small basin streams I've observed, I observed that the inter -- the fairly 4:47PM

frequent occurrence, especially during the late summer of intermittent streams in the area.
Q Of those that -- the streams that we're talking about here?
A I don't know. 4:48PM
Q Do you know whether all of the streams in the Illinois River Watershed that were sampled are designated cool water aquatic communities?
A I believe that there was one stream and I don't remember its name that was designated as a warm water stream.
Q How was that determined?
A I don't know. I recall it being specified as such in some information from, I think, the Oklahoma Water Resources Board. 4:49PM
Q Do you recall what the information was?
A I don't, but I just recall seeing something and -- on that particular stream that indicated that -- that it was designated as a warm water stream rather than a cool water stream. 4:49PM
Q Did you check all of the streams for their designation?
A No, I did not. I did not myself check all of the streams for their designation.
Q Did anybody check the streams for their 4:49PM

designation? 4:50PM
A Well, I believe it would have been Dr. Kierski but -- who assembled the initial information on the -- on the designation of these streams because I recall specifically asking him whether they were designated cool water or warm water. 4:50PM
Q Do you know whether Dr. Kierski has ever worked with Oklahoma water quality standards?
A I don't know.
Q Can you tell me when data transformations are appropriate for statistical analysis and when they're not? 4:51PM
MS. COLLINS: Object to form.
A Well, that is a -- a broad topic and there's no simple answer to it and it involves a lot of considerations of the -- the nature of the underlying data, the kind tests that might be applied to those data and the -- the candidate transformations. And as we talked before, the decisions about using either a parametric or a nonparametric test. 4:51PM 4:52PM
Q What are power transformations?
A Power transformations are transformations that -- well, that are based on the -- I think you mean raising the number to a certain power. It could be based on a logarithmic or a square or cube-type relationship. 4:52PM

Q Do you know whether Dr. Stevenson used power transformations? 4:52PM
A I think he did but I -- I don't recall all of his different transformations he used.
Q Could you look at 2-2 of your report, specifically Paragraph No. 5? 4:53PM
A Yes.
Q This is a discussion of the IBI scores for all of the Illinois River Watershed streams you assessed, is that correct? 4:53PM
A Yes, it is.
Q And it says 83 to 100 percent, depending on the year in the data set, were either indicating a full support -- fully supported cool water aquatic community or where a conclusive decision regarding attainment of a cool water community requires further investigation, is that correct? 4:54PM
A Yes.
Q How many of the stations were at the level where you could not determine whether the fish and wildlife beneficial use was being met? 4:54PM
MS. COLLINS: Object to form.
A I don't recall that number. I don't know if it's -- if it's back in the -- in that particular section of the report or not. 4:54PM

Q Would you turn to Figure 5-26? 4:54PM
A Okay.
Q Can you tell me, by looking at Figure 5-26, how many of the sampling stations were deemed to fully support the cool water aquatic community beneficial use? 4:55PM
MS. COLLINS: Object to form.
A Well, this would indicate that -- that I think seven are not fully supporting.
Q Okay. Let's talk about the charts in more detail. Does the blue on this figure indicate full support? 4:56PM
A Yes.
Q And what does green indicate?
A Green is undetermined, that intermediate range.
Q And yellow represents not supported? 4:56PM
A That's correct.
Q And how many of the lines are in the blue section?
A Well, seven of them are either right on the boundary or above the line.
Q How many are above the line? 4:56PM
A Well, one.
MS. COLLINS: Object to form.
A One is actually above the line.
Q And the line, what does the line represent on here? 4:57PM

A The line represents 37, a score of 37. 4:57PM
Q And how many of them are below the line?
MS. COLLINS: Object to form.
Q Just to clear up, how many on here are designated as not insufficient -- let me try to reword that. 4:57PM
How many of them on here are such that you could not determine whether the cool water aquatic community was being met?
A It looks like five or -- five of them.
Q Would you turn to Figure 5-27? Can you identify 4:58PM on this chart -- let me go back to the 2005 question and figure. Did you have habitat data available for the 2005 data?
A As I remember, there was some very limited habitat available but it was limited. 4:58PM
Q Why do you say "limited"?
A It was relatively few variables, as I remember.
Q Which variables?
A I think they were -- there may have been information on stream width and depth, a few other 4:58PM basic variables. I don't -- I don't recall right now. I would have to go back and look, but it was -- it was not, as I remember, a -- a full set of habitat variables that were collected in 2005.
Q Do you recall what habitat variable you were 4:59PM

missing from the data set that you needed to do your 4:59PM analysis?
A No, I don't.
Q Did you use the available habitat data in your analysis in any way? 4:59PM
A No, I did not.
Q Why not?
A It just -- well, one, I was placing -- it was a relatively small number of sites for the 2005 data based on the subsequent years. And there were 4:59PM limitations, as I recall, on the amount of habitat data that was there and I didn't have habitat data for the other two years so I -- I remember making it there for the other year for the case of fish. And I made the decision not to try to analyze that data any further. 5:00PM
Q And on Figure 5-27 with regard to the 2007 sampling stations, how many sampling stations were such that you determined the cool water aquatic community was fully supportive?
A It appears to me that 15 stations would either 5:00PM fall on the line or exceed the line for fully supported.
Q And how many were determined not to support the cool water aquatic community?
A It appears that four stations fall below the lower 5:01PM

threshold. 5:01PM
Q And how many were you then able to determine whether or not the beneficial use was being met?
A It appears that 14 sites are undetermined.
Q So 14 sites are undetermined and four are 5:01PM determined to not support, is that correct?
A That's correct.
Q And -- and how many did you identify as supporting the beneficial use for cool water aquatic communities that you recall? 5:02PM
A It appears that -- it appears that 15 would either be on the line or above the line for a score of 37.
Q Are you certain that when one of the lines is on -- when one of the sampling stations is on the line that that means that it is fully supporting? 5:02PM
A As I recall, the scoring system, fully supporting is indicated when the score is 37 or above.
Q So would it be accurate to say that, the math I'm not very good at, you had 33 total sites that you assessed in 2007? 5:03PM
A I think it was -- I think there were 35 stations sampled in 2007, as I remember. There were 35 sampling stations.
Q And there are --
A Oh, there is one warm water stream here that is -- 5:03PM

is classified as fully supporting that I don't think I 5:03PM was counting.
Q That's 34?
A So I must have made a mistake in looking across this graph. I recall that there were 35 stations 5:04PM sampled during that year.
Q Well, based on accounts that we made here, does it appear that out of the 34 sites only 16 were identified as fully supporting the cool water aquatic community?
MS. COLLINS: Object to form. 5:04PM
A That is the count that I get.
Q On Page 6-23 of your report, you state that, in fact, the fish community appears healthy over all when you're looking more broadly at the fish data for the Illinois River and its tributaries available from state 5:05PM and federal sources, is that correct?
A Which page were you referring to again?
Q 6-23.
A And where were you on that page -- oh, I think I see. Were you right at the bottom of the page? 5:05PM
Q Yes.
A Yes.
Q What other fish data for the Illinois River and its tributaries available from state and federal sources are you referencing? 5:06PM

A The other data, I guess, would be associated with the BUMP reports where there were several stations evaluated by the Oklahoma Water Resources Board as far as -- as whether or not they were supporting fish and wildlife. And then I reviewed another report that was done by the Environmental Protection Agency. 5:06PM

Q Is the report done by the Environmental Protection Agency the 2004 study of Arkansas streams?

A Yes, that's correct.

Q When you say that the data for the Illinois River and its tributaries indicate that it appears healthy overall, what do you mean by "overall"? 5:07PM

A Well, I think what I mean is taking a broad look at it and using multiple indicators of -- of the fish community that although there may be situations in some of these smaller streams where the, for example, based on the one index, the IBI, indicates that the -- that the -- that the beneficial use is not fully supported, when one looks at the individual components and looks at metrics such as either their relative presence of tolerant species and the presence of intolerant species throughout the system, that the indication is that there -- that this is a healthy community, that it's not being stressed by -- stressed greatly by either water quality or habitat, actually, and there may be 5:07PM 5:08PM

some habitat limitations in some areas. 5:08PM

Q Can you say whether or not there has been any degradation of the fish or macroinvertebrate communities in the Illinois River Watershed as a result of either habitat or nutrient pollution? 5:08PM

MS. COLLINS: Object to form.

A There are habitat modifications, there's indications, for example, in the EPA report, about effects on benthos in certain areas due to sedimentation, and effects downstream of urban areas and sewage discharges because they had some stations located in those areas, so I think that those effects were -- were indicated in that particular study in some of the more -- the more eastern stations. 5:09PM

Q Do you have an opinion about whether there has been any degradation of the fish community or the benthic macroinvertebrate community as a result of nutrient pollution in the Oklahoma portion of the Illinois River Watershed? 5:09PM

MS. COLLINS: Object to form. 5:10PM

A There may have been some effects and I -- there are -- especially downstream of sewage treatment plants, although I don't think that, as I indicated before, the data are, are somewhat limited because the kinds of sediment analyses that could be useful in evaluating those causal factors, such as sediment organic content, were not available so there may be some effects in certain areas. I can't say because of limitations of the available data. 5:10PM

Q Do you believe that those effects from -- potential effects from nutrients are limited to areas below waste water treatment plants? 5:10PM

MS. COLLINS: Object to form.

A Not necessarily, but there is -- is some indication that that could be a causal factor. 5:11PM

Q And that indication, where do you get the indication from?

A Based on some sampling stations that were downstream of waste water treatment plants.

Q Is that the EPA study that you're referencing? 5:11PM

A No, I think there were some stations in the State's data set that may have been influenced, but as I said, without data on either tracer chemicals for sewage discharges or -- or measurements of organic content in the sediments, I can't resolve that data. 5:11PM

Q Did you undertake to identify -- to correlate the sample locations with the impacts of waste water treatment plants?

A No.

Q Does the BUMP report assess all of the streams in the Illinois River Watershed? 5:12PM

5:12PM

A No, it doesn't. There are a number of stations, and I think it might have been six or seven, perhaps seven, that are located -- sampling stations that are located on what I would characterize as the larger streams -- on some of the larger streams within the Illinois River Watershed.

Q Do you rely on the BUMP report for your conclusion that the Illinois River and its tributaries appear healthy? 5:13PM

A I think that that is one piece of information I considered, the fact that the BUMP report for some of these major streams in the system had concluded that the beneficial use associated with fish and wildlife was being supported with one exception, as I recall, where turbidity was identified as a -- as a limiting variable for the non-support. 5:13PM

Q Would you expect to be able to extrapolate the results of the assessments on an area like, say, the Illinois River at Watts to all of the tributaries in the Illinois River Watershed? 5:13PM

MS. COLLINS: Object to form.

A No, not extrapolate. I said it's one piece of information, but I think it's -- it's important to note that those are -- those are the -- the major and 5:14PM

permanent streams, many of them, that exist within the system that have significant flow and those are the ones that apparently were collected by the Oklahoma Water Resources Board to monitor. And they also provide an integration of the -- of any nutrient loading or any other factors that might be upstream that would be -- be flowing down into those major streams, so I think it's -- it's important to look at that information. 5:14PM

Q And my question really isn't whether it's important to look at the information, my question is whether or not looking at the BUMP reports for stations on the main stem tell you anything about the quality of the fish community in the tributaries and streams. 5:15PM

A And as I said, no, you can't provide a direct extrapolation from the main stem of the river to small tributaries upstream. But once again, those stations downstream are integrating any effects or any water quality situations that may exist in the small streams. 5:15PM

Q Could the -- a concentration of total phosphorus cause a more severe impact in a tributary stream than that same concentration in a main stem site like the Illinois River at Watts? 5:16PM

MS. COLLINS: Object to form.

A I don't think you can say that as a general thing. 5:16PM

For one, the effect that phosphorus can have in a stream is dependent on the residence time that it exists in a particular stretch of water. If any nutrient stimulation effects of phosphorous are going to occur, there has to be time for that phosphorus to be taken up by plants and -- and, for example, phytoplankton, and moved downstream so that just -- and if it's a situation where there may be a much higher gradient and therefore more rapid flow in a tributary stream versus a very slow flow in a main stem, the opposite could be true depending on the site specific characteristics that there could be actually greater potential for adverse effects in a larger, slower moving main stem than in a smaller faster moving tributary. 5:16PM 5:17PM

Q Did you -- did you review the State's list of impairment waters in the Illinois River Watershed? And by that I mean the Clean Water Acts 303D list?

A No, I did not. At least I don't recall. I don't recall it now as I sit here. 5:18PM

Q Do you believe that the -- the Oklahoma Water Resources Board selected the beneficial use monitoring program sites in order to characterize fish communities and impacts in the entire Illinois River Watershed?

MS. COLLINS: Object to form. 5:18PM

A No, I don't have any indication that that was their goal. 5:18PM

Q Do you know which segments of the Illinois River that BUMP sites are intended to represent?

MS. COLLINS: Object to form. 5:19PM

A Not specifically, no.

Q Did you understand my question? Should I rephrase it?

A Well, maybe you should.

Q Is there a BUMP site on the Illinois River -- Illinois River main stem? 5:19PM

A I believe there are two.

Q And which segments of the Illinois main stem are those stations intended to represent in terms of water quality standards compliance? 5:19PM

A I don't -- I don't know what their intent, which segments they're intended to represent. As I recall, one station is near Watts and one station is near Tahlequah.

Q Do you know what I mean by a "river segment"? 5:19PM

A Well, in general I know what it means, yes.

Q Do you know what I mean by a "river segment in the Illinois River main stem"?

A I'm not sure I do.

Q Do you know whether the beneficial use assessment protocol require or establish segments -- segment lengths that are appropriate for representation as a -- at a particular sampling location? 5:20PM

A I don't remember that, no.

Q With regard to the Arkansas EPA report from 2004, did it assess all of the streams in the Arkansas portion of the Illinois River Watershed? 5:20PM

A No, it did not.

Q How many of the streams were assessed?

A Oh, right now would be a rough estimate. I would guess it's on the order of five or six maybe, but I don't recall exactly. I can envision some of the stations, but there were multiple stations on some of the streams so it was not a high number. 5:21PM

Q Was it -- does that report provide adequate information for you to characterize fish communities in the entire Illinois River Watershed? 5:21PM

A No, it does not.

Q Does it provide adequate information for you to assess fish communities in the Arkansas portion of the Illinois River Watershed? 5:22PM

A It provided some -- some indication of point -- of some potential effects and also points where the EPA concluded that there were not adverse effects on fish, but it does not provide a total characterization, but 5:22PM

it -- I thought it was interesting that it did include 5:22PM
two sampling stations that were located just on the
Illinois River itself just before the river crosses
over into Oklahoma.
Q Where are these five streams located in Arkansas 5:22PM that were assessed?
A Well, I should go to a map to look at them. I
know there were -- there were stations on the Illinois
River, I think there were stations on Osage Creek,
there may have been -- I'm just guessing right now. 5:23PM
There may have been a station on the Muddy Fork and one
other stream.
Q Were impacts noted on Osage Creek?
A I think there were, yeah.
Q Were impacts noted on the Illinois River? 5:23PM
A Well, I recall that at Stations IL 20 and 22, I
don't think there were any adverse effects noted on the
fish communities at those two stations on the Illinois
River.
Q Were they noted in any other stations? 5:23PM
A I don't have all that in mind as far as where
there -- where they noted effects and where in all the
stations that they didn't.
Q I'm going the switch topics to fish and macroinvertebrates in Lake Tenkiller. What is habitat 5:24PM

squeeze? 5:24PM
A Well, that term, I guess, in a general sense and
it's not one that I typically use, but I think I have
an understanding of what -- what Dr. Welch means by the
use of that term in his report, is the concept that 5:24PM
there may be water quality conditions that are -- that
are stressful to an organism and, therefore, the
available habitat for that organism ends up being
smaller than it might otherwise have been because of
those water quality conditions. 5:25PM
Q And in Lake Tenkiller, are those water quality conditions a combination of dissolved oxygen levels and temperature?
MS. COLLINS: Object to form.
A Well, that was the -- that was the opinion of 5:25PM
Dr. Welch, as I recall, from his report.
Q Do you disagree with Dr. Welch?
A Well, I believe that there are dissolved oxygen
conditions in Lake Tenkiller that -- that would result
in a decrease in habitat for fish, for example, 5:25PM
compared to a situation where the lake was not
stratified during the summer and the lake was fully
oxygenated.
Q And you agree that results in less habitat, less available habitat for fish? 5:26PM

MS. COLLINS: Object to form. 5:26PM
A Because of that summer stratification, it does.
Q And how does temperature come into play in terms of habitat in Lake Tenkiller?
MS. COLLINS: Object to form. 5:26PM
A Well, temperature comes into play as far as what
the temperature would be in the epilimnion or the
surface areas during the summer where the fish would be
living at that time.
Q And do you -- do you disagree with any of the, um, 5:26PM data that Dr. Welch looked at which indicated -- which was used to develop the figures in his report demonstrating the habitat squeeze, i.e., the temperature data and the DO data?
MS. COLLINS: Object to form. 5:27PM
A Well, I -- thinking back, I disagreed with some of
Dr. Welch's characterizations with some of the fish
species as far as their optimal temperature ranges and
so that would be a disagreement relative to the point
at which a habitat squeeze due to temperature may be 5:27PM
actually occurring.
Q Do you disagree with his representations of the volume of the lake that are adversely impacted or that have DO levels below water quality standards? I'm going to rephrase that, it's late. 5:28PM

Do you disagree with his -- his 5:28PM representation of the volume of the lake that is -- has DO levels that are not meeting water quality standards?
MS. COLLINS: Object to form. 5:28PM
A I did not evaluate that, his determinations in
that area.
Q Do you disagree with representations of where temperature -- of the temperatures that are reflected in his figures in his report? 5:29PM
A I did not conduct an evaluation of his -- the
actual temperatures that he used to characterize the
lake. I did not evaluate those.
Q Did Welch evaluate water quality information and water quality standards in determining injury? 5:29PM
MS. COLLINS: Object to form.
A I don't -- I don't remember. That was not an area
that I was -- that I was evaluating in Dr. Welch's
report.
Q Is establishment of a base line condition a 5:30PM mandatory requirement for conducting a natural resource damage assessment?
MS. COLLINS: Object to form.
A Well, based on my reading of the -- well, could
you repeat the question again, please? 5:30PM

Q Is establishment of a base line condition a mandatory requirement for conducting a natural resource damage assessment? 5:30PM

A Well, I think it's a central part of -- well, let me say that, first, if the natural resource damage assessment is not conducted according the DOI rule, then I suppose that it's possible that a natural resource damage assessment could be conducted without the concept of base line, but that being said, I think that base line is defined in the -- in the DOI rule is not just a concept that's unique to that particular rule or -- or even natural resource damage assessments. But the concept of base line, to me, is consistent with the concept of what might constitute an appropriate reference system's description for -- for other assessments, like an ecological risk assessment. So it's very consistent with the scientific approach that would be used to determine any incremental effects of a particular discharge or release. 5:31PM

Q Would you agree with me that base line is defined in the DOI regulations as the conditions that would have existed in the assessment area had the release of a hazardous substance not occurred, taking into account both natural and anthropogenic processes? 5:32PM

A That does sound like the definition right out of the rule. 5:32PM

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Q So the condition that would have existed in the assessment area had the release of hazardous substances not occurred?

A Yes. But that -- an important concept there is the release -- is what is the release. It's important to be able to distinguish between the release of a hazardous substance from a -- what's termed a facility by a PRP that may be assessed versus all of the other sources of that particular hazardous substance that are not associated with a PRP in the assessment. 5:32PM 5:33PM

Q You believe that -- where is that in the definition of base line, that concept that you just expressed?

MS. COLLINS: Object to form. 5:33PM

A I don't know that it's in the definition, but I think it's implicit in the description in talking about -- when you're talking about a release, that is a release -- that means a release by the party or parties associated with a facility that's being assessed. And if for whatever the hazardous substance might be, if there are other sources of that particular substance, either natural or anthropogenic, then those become parts of the base line and the goal is to separate out that incremental change from base line associated with 5:33PM 5:34PM

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the release that is being assessed or the release that's alleged to have occurred. 5:34PM

Q Do you have any support for your interpretation of the rule in that manner?

MS. COLLINS: Object to form. 5:34PM

A Well, I think there's wording in there, both in the -- in the overall description and in -- even in some background materials on the rule and just the way -- the way that the -- if you move on in the process about the quantification of injuries and looking at the difference from base line conditions, the base line must consider all of those natural or anthropogenic factors that may be influencing the resource, but for the release and the release is -- is what is -- what is being assessed. 5:34PM 5:35PM

Q On Page 7-3 of your report -- let me get back to that.

Do you have any document, example, guidance, anything that would support your interpretation of the rule in that way? 5:35PM

MS. COLLINS: Object to form and if you want to provide him with a copy of the statute which is what he referred to in his last answer, so that he can point you to it, please do.

A I can't -- I can't recall. I would -- as far as 5:36PM

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very specific guidance or documentation of that opinion, I could tell you in part it is based on my experience and my experience in dealing with trustees at sites where there are multiple sources of -- of a particular substance and it's -- it comes into play, for example, with, let's say, a substance like copper where there may be a wide variety of sources of copper ranging from anthropogenic sources to natural sources of copper to a system. And the goal of such assessments in my experience has been if a particular facility is alleged to have released copper and it could potentially be causing injuries, then the goal is to look at the incremental changes that may have occurred because of the release, but in my experience, trustees have not considered, let's say, a natural source of copper or a copper associated with a non-PRP in a particular case, to be part of the release. The release, in my experience, has been associated with a facility or facilities. 5:36PM 5:37PM

Q Okay. We've got to stop to change the tape. 5:38PM

THE VIDEOGRAPHER: We are now off the record. The time 5:38 p.m.

(Following a short recess, proceedings continued on the record.)

THE VIDEOGRAPHER: We are now back on the 5:41PM

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record. The time is 5:41 p.m. 5:41PM
Q Would you agree that there are ways other than -- ways to establish base line, other than properly located control or a reference area?
MS. COLLINS: Object to form. 5:41PM
A Yes, there are. Base line could be established, for example, by looking at pre-release conditions and comparing prerelease conditions with post-release conditions.
Q You say a valid base line comparison using a reference area is essential to quantifying any injury that is based on field observations. Did you intend to limit that statement to only situations involving field observations? 5:41PM
MS. COLLINS: Object to form. 5:42PM
A Could I hear that statement again, please?
Q On Page 7-2 of your report you stated, "a valid base line comparison using a reference area is essential to quantifying any injury to a natural resource that is based on field observations." 5:42PM
A Well, field observations, yes, to be able to -- if you're collecting data from the field, there needs to be something, some reference to be able to compare that against, to compare the natural variability in the assessment area to some -- some reference and that 5:43PM

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could be, like I said, it could be a pre-discharged 5:43PM condition as a reference. It could be a reference water body, it could be an upstream reference location. There's many ways that that -- that reference area evaluation could be conducted. 5:43PM
Q Why do you believe Broken Bow Lake is not an appropriate reference lake for Lake Tenkiller?
A In my assessment, it has very different conditions than Tenkiller would have, but for any -- any effects, if there are any, of releases from poultry litter 5:43PM applied to fields. An appropriate reference lake should have a number of kinds of similarities to Lake Tenkiller, if it's a valid lake. It should be -- it should have similar size, depth, hydraulic residence time, it should have a similar ratio of its -- its size 5:44PM compared to its drainage area. So there are many similarities it should have. It should be essentially operating the same way from an ecological perspective. And then, very importantly, it should have all of the -- the same kinds of influences of nutrient sources 5:44PM that the assessment lake would have, but for any contribution that might be occurring from the application of poultry litter to fields. And so it should have the same sewage components as far as any phosphorus loading and in all the other potential 5:45PM

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sources of phosphorus, except for the release being 5:45PM assessed.
Q So, basically, an appropriate reference lake, in your opinion for Lake Tenkiller, would be a reservoir that's pretty much like Lake Tenkiller without poultry? 5:45PM
MS. COLLINS: Object to form.
A Without whatever contribution there may be from poultry operations.
Q Where would I find this watershed?
A That is -- that gets at the essence, though, of a 5:45PM reference lake. Because when you compare a reference lake to an assessment lake, that is what allows you to determine any incremental change that is occurring because of the alleged release.
Q But where would I find a lake like that? 5:46PM
A I have not done an evaluation of candidate lakes like that. I'm describing -- you asked me what -- what would constitute a valid reference lake.
Q And this is because of your interpretation of base line as an assessment needing to assess an incremental change, is that right? 5:46PM
MS. COLLINS: Object to form.
A Yes, the incremental change or incremental loss of services that are caused by the release of a hazardous substance being assessed. 5:46PM

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Q If I was wanting to compare Lake Tenkiller to another lake in the State of Oklahoma to assess the -- assess the effects on eutrophication from input of phosphorus, is Broken Bow a suitable reference lake? 5:46PM
MS. COLLINS: Object to form. 5:47PM
A I still believe there would be significant problems with Broken Bow being a valid reference lake because there still needs to be a demonstration, in my opinion, that all of the other factors, except for phosphorous need to be similar. So the lake would 5:47PM still need to be -- to have all of those similar hydrographic and physiographic similarities, such as volume, depth, hydraulic residence time, surface area relative to the drainage area, the age of the reservoir would be important, so -- and all of those other 5:48PM factors other than phosphorus that might be influencing the water quality in the lake.
Q And did you evaluate those factors with regard to Broken Bow in comparison to Lake Tenkiller?
A I only looked at some information that I -- that I 5:48PM indicated, that indicated to me that it was -- it had distinctive differences in some of the characteristics and I didn't do an exhaustive evaluation of all of them.
Q Which characteristics did you look at that you -- 5:48PM

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that make it an unsuitable lake for comparison of just phosphorus loading impacts? 5:48PM

A Well, I was not looking at it in -- in the way you describe, as a -- as a reference lake for phosphorus loading. It's my understanding this case involves the question of phosphorus from poultry litter applications and so I don't -- I don't know the relevance of looking at -- looking at it as a reference lake just for phosphorus in general given all of the sources of phosphorus that may exist in the system. 5:49PM

Q But what particular concerns do you have about using it even in that situation where that was being assessed?

A Well, the main concerns there would be associated with a demonstration that -- that all of the other sources of phosphorus, but for any phosphorus released from poultry litter applications would be similar between the two lakes. In addition to differences in -- in other factors. I think one that comes to mind is just the overall relationship of the -- of the lake size to its watershed. I think those are very different for Lake Tenkiller and Broken Bow Reservoir. 5:49PM 5:50PM

Q So are you offering an opinion in this case that Broken Bow Reservoir is not an appropriate reference lake if what is being evaluated is the impacts of phosphorus loading to Lake Tenkiller? 5:50PM

MS. COLLINS: Object to form.

A Well, my opinions are as stated in the report. I think that even with this -- this situation you have described, I think there are significant enough differences between Broken Bow Reservoir and Tenkiller Reservoir that, in my mind, it would be highly questionable whether it would -- could even serve as a -- as a very generalized reference lake like you described. 5:50PM 5:51PM

Q And have you identified all of the differences that lead you to that opinion?

A No, I have not. I did not do an exhaustive review of all of the potential differences between Broken Bow and -- and Lake Tenkiller. 5:51PM

Q Would you turn to Page 7-8 of your report, 7-8?

MS. COLLINS: It's now 5:52.

Q In the first paragraph there, you indicate in the very last sentence that, "Walleye compared may be closer equivalent with Broken Bow fish as indicated by the greater than point one size class." Do you see that sentence? 5:52PM

A Yes.

Q Why don't we read the rest of the sentence, when you say ".1 size class," what is a .1 size class? 5:52PM

A I don't know. I think there may be a typo there. I'm not sure. I would have to go back and check that, check the size classes. 5:52PM

Q And the small-mouthed bass comparison was made between greater than or equal to 40 size class. Is that 40 a size -- that number right there is a size class for small-mouthed bass? 5:53PM

A That's my recollection, that those were the -- were the characterizations used in the -- in the actual data as far as the various size classes and numbers that were caught in those sizes classes. 5:53PM

Q What does 40 represent, 40 --

A As I sit here, I just don't recall in that data set what those size classes referred to.

Q What are the differences in habitat factors between Tenkiller Ferry Lake and Broken Bow Lake? 5:53PM

A They're -- from what I remember reading, Broken Bow Lake is a -- it's a oligotrophic lake. I think it has -- I think it has different shore line configurations. I think it may have more rocky habitat in it. It's structure of the water column is different. I think the dissolved oxygen levels are different in Broken Bow. And I recall a -- the BUMP report characterizing it as having fairly unique characteristics that were different than other lakes in the region. 5:54PM 5:55PM

Q Do you recall what those characteristics were?

A I don't remember.

Q What is the source of your information regarding the shore line and rocky habitat in Broken Bow? 5:55PM

A I seem to recall reading something on that, but I don't recall that source right now.

Q Do you think Lake Keystone and Lake Texoma are appropriate reference lakes for Lake Tenkiller?

MS. COLLINS: Object to form. 5:55PM

A No, I don't have that opinion at all.

Q Why are walleye not well adapted to eutrophic conditions?

A Well, walleye are a -- they're generally considered to be a cool water fish. They are -- they are most -- they do best in more northern latitudes, actually, and in -- in deep lakes with cool water that -- that suit them more. And in warmer lakes, they, they -- it's just not their preferred habitat so on everything else being equal, they will usually do better in cooler water. 5:56PM 5:56PM

Q But what is it about eutrophic lakes that they're not well suited to?

A Well, if the lake is eutrophic and also undergoes stratification, then they may not have access to the 5:57PM

deep cool waters that may exist in that lake.
Q Because there's no oxygen there, is that right?
A Or low oxygen.
Q Is the small-mouthed bass fishery in Broken Bow better than the one in Lake Tenkiller? 5:57PM
A Well, it's variable. As I remember, in some years the catch was better in Broken Bow and I think there were some years that the catch in Tenkiller was actually better than Broken Bow.
Q Do you agree that small-mouthed bass and striped bass can experience summer stress when deprived of oxygenated water at a preferred temperature? 5:57PM
A It's possible if -- if you reach certain temperatures, high enough temperatures and low enough oxygen levels that any fish, including striped bass and small-mouthed bass can experience stress during those -- those times of year. 5:58PM
Q Do you agree that reservoirs with critical habitat should be protected from enrichment because increased nutrient levels can eliminate optimal habitat? 5:58PM
A Well, that's a very general statement. I think that fish habitat is -- is an appropriate consideration and needs to be considered by fishery managers and that -- that any lake should be evaluated as far as what its -- what its habitat is, whether or not the 5:59PM

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habitat is changing, and which species might be appropriate for management in that lake given its habitat. 5:59PM
MS. COLLINS: Mr. Videographer, can you tell me what time you have? 5:59PM
THE VIDEOGRAPHER: It is officially 5:59 p.m.
Q So would you let me ask a few more questions? I'm almost done with my outline.
MS. COLLINS: Okay.
MS. BURCH: I would greatly appreciate it. 5:59PM
MS. COLLINS: Hopefully they will be quick.
MS. BURCH: I think they will be.
MS. COLLINS: Okay.
MS. BURCH: I really do. Thank you.
Q What information do you have to support your opinion that there is not adequate spawning habitat in the Illinois River above Tenkiller Ferry Lake? 5:59PM
A For which species?
Q Striped bass?
A Oh, well, striped bass require a couple things as far as spawning habitat goes. They -- they spawn in rivers and their eggs are relatively unique among freshwater game fishes in that the eggs are planktonic, as well as the larvae, so when striped bass make spawning runs in rivers, there needs to be sufficient 6:00PM

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length of the river and depth and flow to be able to keep those eggs suspended in the water column for their entire incubation period. And the same goes for the early life stages of larvae. And that usually requires a significant river to be able to allow for that. And, in my opinion, in just what I've seen of the Illinois River, it does not provide that flow and depth and length that would be appropriate for striped bass. 6:00PM
Q What do you mean, what you've seen in the Illinois River? 6:01PM
A Well, in just observing it and looking at the depth of the river and the relative flow of the river.
Q Did you do any measurement or analysis to support that view?
A No, I didn't. 6:01PM
Q Did you review any research that supports that view?
A Well, I'm familiar with papers that describe the kinds of river habitat that -- that are appropriate for striped bass spawning and I know something about the lakes where striped -- natural striped bass spawning has been -- has been documented. 6:01PM
Q But did you -- did you see any research that actually looked at striped bass spawning habitat in the Illinois River Watershed and agreed with your conclusions based on your visual evaluations? 6:02PM
A No, I didn't.
Q Okay. On Page 7-15 of your report, you cite Zale for the proposition that striped bass tolerated temperatures up to 28 degrees, is that correct? 6:02PM
A Let's see, I'm not seeing it on this page. Oh, okay. Yes, I see that.
Q Do you agree that Zale also found that striped bass can tolerate exposure to temperatures of 27 to 28 degrees Celsius for about a month, but will die when exposure is 28 degree Celsius is prolonged? 6:03PM
A I don't recall that from Zale. I would to have go to Zale and evaluate that.
Q Okay. I'm going to hand you what I've marked as Exhibit No. 4 and I'm going to -- I don't have this highlighted for you, but I would refer you to the abstract and if you're comfortable relying on the abstract, we'll go quickly. If not, we can look into it? 6:03PM
MS. COLLINS: How many minutes do you think you have left because I've got about five minutes and we're already past the agreed time. 6:03PM
MS. BURCH: I have one more question after this. Depends on how this one goes in terms of time.
A It does say in the abstract what I think you 6:04PM

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represented, that -- that in this particular lake that they -- the fish died of malnutrition when they're exposed to around 29 degrees C, it says, for a similar period, which is about a month. 6:04PM

Q Let's deal with the particular quote I'm talking about, though. If you could turn to Page 75 of that document, which is, I think, the last -- second to the last page? 6:04PM

A Yes.

Q Would you read into -- do you see the paragraph right above the paragraph titled Acknowledgment? 6:05PM

A Yes.

Q Would you read that first sentence of that last paragraph into the record?

A The sentence starting "Our findings?" 6:05PM

Q Yes.

A "Our findings suggest that adult striped bass at Keystone Reservoir can survive exposure to water temperatures of 27 to 28 degrees C for about a month, but die if exposed to slightly higher temperatures, around 29 degrees C, for a similar duration or exposure to 28 degrees C is prolonged." 6:05PM

Q Do you agree with that statement?

A Well, that -- that is what it says here.

Q Is Keystone Reservoir located in Oklahoma? 6:06PM

A Yes, it is. 6:06PM

Q And the last question for me of the day is: Would you agree that Cooke and Welch found that benthic macroinvertebrate populations were essentially absent in the sediments of Lake Tenkiller? 6:06PM

MS. COLLINS: Object to form.

A I don't know about your characterization of the essentially absent. I know that the abundances that they -- that they measured in the samples that were evaluated had relatively low abundances when compared to Broken Bow Reservoir, but -- and I know that they were relatively low, but I also question the -- the actual sample size, the sediment data. I could find no indication of what the particle size, organic content was. I think I knew the depth of the sample locations. 6:06PM 6:07PM So the abundances were relatively low but I don't know if characterizing them as whatever you did essentially absent is --

Q Essentially absent.

A -- is accurate. But they were low. 6:07PM

Q Do you know what the cause of low macroinvertebrates are in eutrophic lakes?

A Well, there are -- I mean, there's potential, there's relationships between benthic macroinvertebrates and depth in reservoirs. I think 6:08PM

that I found it interesting that I believe that in that same data set there were benthic samples collected from I think it was called, Stockton Lake in Missouri, which is a mesoeutrophic reservoir, and I think those abundances were also low. 6:08PM

Q Do you know whether the -- the sampling in Stockton Reservoir included rivering sections of the lake?

A I don't recall where the samples were collected in Lake Stockton. 6:08PM

Q I guess I'm asking you that. In terms of the classification of the lake as mesotrophic?

A No, I don't recall.

Q And I didn't really get a direct answer to my last question, which is my actual really last question. And that is: Can eutrophic conditions in a lake contribute to low abundance of macroinvertebrates in sediments? 6:08PM

A Yes, it can.

Q Okay. Thank you very much.

CROSS EXAMINATION 6:09PM

BY MS. COLLINS:

Q Okay. Moving quickly, would you turn to Page 5-1 of your report, Dr. Ginn?

A Yes, I have it.

Q The second paragraph there, take a minute and look at that and let me know if that refreshes your recollection as to what the basis was for your designation of cool water aquatic community subcategories in the IRW? 6:09PM

A Yes, it does. It indicates that the designations were in an appendix to the document that's cited there where -- where those classifications were made. 6:09PM

Q Okay. And could you turn to Table 5-14 in your report?

A Yes. 6:10PM

Q What is the title of this table?

A It's Summary of Fish IBI Scores for Sample Locations Located Downstream of Cargill Contract Growers and Breeder Operations.

Q Does this table reflect the specific IBI scores downstream of each of the Cargill locations? 6:10PM

A Yes, it does.

Q And can you tell from what is listed in the second column of this table which scores are -- support full beneficial or full use. Get the terminology. Which scores fall in the range of cool water aquatic community that is fully supported versus indeterminate? 6:10PM

A Yes, that's correct.

Q Is the basis of all of your opinions regarding the analysis conducted by Dr. Stevenson and Welch and Cooke 6:11PM

contained in your report? 6:11PM
A Yes, it is.
Q Did you review all aspects of Dr. Stevenson's analyses and Dr. Cooke's analyses and Dr. Welch's analyses and opinions that you considered significant to the opinions in your report? 6:11PM
A Yes, I did.
Q Can you state any opinion on the impacts of fish or benthic communities without considering a source of possible contamination? 6:12PM
A Yes. I think I indicated, but to clarify, I think it's possible to evaluate the status of a particular community at a particular point without consideration of the source of any stressors. The key is how does that community appear to be based on various metrics 6:12PM associated with indicator for species, diversity, different indices, numbers of tolerant and intolerant species, et cetera.
Q Okay. Was there any analyses reflected in your report that was not performed at your direction or under your supervision? 6:12PM
A No. I was -- from the start of my work in this matter, although I was working as part of a team, I -- I directed, suggested and supervised the analyses that were being conducted by the -- the team members that 6:13PM

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I've identified. 6:13PM
Q And did you define the scope of the analyses and direct the analyses that were conducted by Drs. Kierski and Palmquist and Ms. Edwards?
A Yes, I did. 6:13PM
Q Are there any opinions stated in your report that reflect the opinions of Drs. Palmquist, Kierski or Ms. Edwards as opposed to your own opinion?
A Well, the opinions expressed in my report are my opinions based on the analyses of the data that were 6:13PM conducted.
Q And did anyone write any section of your report that -- let me rephrase that.
Is there any section of your report that was written by someone -- by your team that you did not then review and independently analyze and form conclusions about? 6:14PM
A Well, as I indicated, there -- there are parts of the report which may be results or figures that I did not independently analyze, but that being said, there 6:14PM are no parts of the report that -- the results of which are presented in there, that I would disagree with or do not support as part of my opinions.
Q And those analyses and figures that you just referred to, did you direct your team members to 6:14PM

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conduct those analyses? 6:14PM
A I did.
Q And did you direct your team members to compile those figures based on your own specifications?
A Well, I directed them to compile the information 6:15PM and produce various figures according to my general instructions. I did not give them precise specifications for exactly how the figure table should be presented, but I characterized the kinds of figures and tables or analyses that I wanted to see conducted 6:15PM and presented in the report.
Q And are all of the opinions stated in the report that was -- that you disclosed in this case your opinions based on your expertise and experience?
A They are my opinions, yes. 6:15PM
Q You mentioned earlier today or yesterday that at one point as a consulting expert you looked at hormones in regards to the biological communities in the IRW. Do you recall that?
A Yes, I do. 6:16PM
Q Why didn't you develop that into a formal opinion in your report?
A I did not carry forward with that evaluation because I did not see any discussion of any potential effects of hormones in -- biological effects of 6:16PM

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hormones in either Stevenson's or Welch's report and so 6:16PM I did not go ahead with any detailed evaluations of hormones.
Q Okay. Can you refer to Exhibit 2 and Ginn 007003 as referenced there? Is there an attachment indicated on this redaction log? 6:17PM
A Yes. It's indicated to be Eco-Cargill.ppt.
Q Okay. I'm going to hand you what is going to be marked as the next exhibit, would be 5 by my count. Could you take a quick look at that and tell me if you recognize this document? 6:17PM
A Yes, I do recognize it.
MS. BURCH: Can I make a record on this?
MS. COLLINS: Sure.
MS. BURCH: Are you asking him about one of 6:17PM the documents that you produced the morning of the deposition that we discussed with the court earlier today?
MS. COLLINS: This was actually produced the day before. Yes, it is that subset and I'm simply 6:17PM referring back to the earlier questions you asked him in which he was allowed to answer.
MS. BURCH: Who was it produced to the day before?
MS. COLLINS: They were made available on the 6:18PM

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14th. 6:18PM
MS. BURCH: To who?
MS. COLLINS: To Rick Garren, David Page and yourself, as I understand it.
MS. BURCH: Okay. I don't know how that's -- 6:18PM okay.
MS. COLLINS: This is not a redacted document you were allowed to ask questions about earlier.
Q My question is: Do you recognize this document to be the Eco-Cargill PowerPoint identified on Exhibit 2? 6:18PM
A Yes, I believe it is.
Q And does this contain the information that you indicated you presented to Cargill at that time related to your initial impressions about the biological communities in the IRW? 6:18PM
A Yes, it is.
Q And is that Bates No. Ginn 007093 through Ginn 007130? It's not on Exhibit 2, but the actual document.
A Oh, I see, 007130 is the end Bates number, that's 6:19PM correct.
Q Okay. That's all I have about that. And finally we'll mark this as Exhibit 6. And if I can set Exhibit 2 beside there. If you would take a moment and look through this and let me know if you recognize that to 6:19PM

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be the documents identified by Bates ranging in the 6:19PM redaction log in Exhibit 2 as opposed to the attachment of the actual document.
A This appears to follow the sequence of Bates numbers that are indicated in Exhibit 2. 6:20PM
Q Okay. And do you recognize these documents? Have you reviewed them before?
A I have seen these before, yes.
Q And with regard to these documents, based on your review of them earlier and during the break today, is 6:20PM there anything contained in these documents which you relied upon or considered in the formation of your opinions in this case to your knowledge that were not already referenced in your report and produced earlier?
A No. There would not be such a category. There 6:20PM are some documents referenced in here or attached herein that I ended up relying on but those documents, for example, the BUMP reports, were included as part of my considered materials and listed in my expert report.
Q And based on your knowledge of these documents, is 6:21PM there -- is it fair to say that all of the information that has been redacted relates to another consulting expert's work and is not related to your opinions in this case?
A That's correct based on my review, the redacted 6:21PM

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information has no relationship to my opinion in this 6:21PM matter.
MS. COLLINS: I don't have any other questions.
REDIRECT EXAMINATION 6:21PM
BY MS. BURCH:
Q I just want to clear something up because I thought we went over this in great detail. When you were asked a question by counsel a moment ago, you said you directed the analysis of the three individuals 6:22PM we've been discussing today who authored sections of your report, is that correct?
A I directed it by I was supervising it and I indicated to them the kinds of analyses that I thought would be appropriate to conduct and the kinds of 6:22PM analyses that I wanted to see for my report.
Q Did you do anything else to direct the analysis? Did you participate in the actual analysis or see copies of the analysis?
A Well, I saw copies at times and I participated in 6:22PM conference calls or meetings with the staff to discuss the results of those analyses.
Q And did you produce copies of drafts of the analysis in your considered materials?
MS. COLLINS: Object to form. 6:23PM

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A No, I didn't. Any drafts that were developed 6:23PM would have been -- ending up being incorporated into my report as it -- as it became finalized.
Q Are you talking about drafts of the summaries?
A Drafts of the summaries. 6:23PM
Q What about the actual analysis?
MS. COLLINS: Object to form.
A I don't recall reviewing any of the -- of the details, for example what might come right out of the computer as far as the analyses, what I was asking for 6:23PM in suggesting analyses were the kind of presentations that are contained in my report.
Q Summaries of the results of their analysis, is that right?
A In some cases, summaries, yes. 6:24PM
Q Do you have any opinions in your expert report related to impacts of poultry on fish biota in the Illinois River Watershed?
MS. COLLINS: Object to form. Beyond the scope of the redirect. 6:24PM
MS. BURCH: It is not. It's related to you asking a question about whether anything in the consulting expert work, which he has not talked about today, is related to his opinions in this matter, so I'm asking him if he has any opinions in this matter 6:24PM

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related to the impacts of poultry on the fish communities in the Illinois River Watershed. 6:24PM

MS. COLLINS: Object to form.

A Well, as I think I answered before, I've done evaluations of the relationships of upstream poultry houses with regard to fish community characteristics in those locations and those data would be, I think, fit under your category for that question. 6:24PM

Q And is there anything in the -- in the work that was done by the consulting experts, which you've not discussed here with us today, that relates to poultry impacts in the Illinois River Watershed? 6:25PM

MS. COLLINS: Object to form and again I'm directing the witness not to answer to the extent that the answer calls for information related to work product of a consulting expert. 6:25PM

A And upon direction of counsel, I can't answer that question.

Q Okay. Thank you very much.

MS. COLLINS: Do you have any questions? 6:25PM

MR. MIRKES: Nothing.

MS. COLLINS: Thank you.

THE VIDEOGRAPHER: This concludes the deposition. We are now off the record. The time is 6:25 p.m. 6:25PM

SIGNATURE PAGE

I, Thomas C. Ginn, do hereby certify that the foregoing deposition was presented to me by Marlene Percefull as a true and correct transcript of the proceedings in the above-styled and numbered cause, and I now sign the same as true and correct.

Witness my hand this _____day of

_____, 2009.

_____
Thomas C. Ginn

SUBSCRIBED AND SWORN TO before me

this_____ day of _____, 2009.

_____
Notary Public

My Commission Expires:

(Whereupon, the deposition was concluded at 6:25 p.m.)

C E R T I F I C A T E

STATE OF OKLAHOMA)
) ss.
COUNTY OF TULSA)

I, Marlene Percefull, Certified Shorthand Reporter within and for Tulsa County, State of Oklahoma, do hereby certify that the above-named witness was by me first duly sworn to testify the truth, the whole truth and nothing but the truth in the case aforesaid, and that I reported in stenograph his deposition; that my stenograph notes were thereafter transcribed and reduced to typewritten form under my supervision, as the same appears herein.

I further certify that the foregoing 217 pages contain a full, true, and correct transcript of the deposition taken at such time and place.

I further certify that I am not attorney for or relative to either of said parties, or otherwise interested in the event of said action.

WITNESS MY HAND AND SEAL this ____ day of April, 2009.

_____
Marlene Percefull, CSR
CSR No. 01818

CORRECTIONS TO THE DEPOSITION OF THOMAS C. GINN PAGE AND LINE NUMBER CORRECTION	